10. **Drosophila rigidipes** (Peck) comb. nov.

Hypholoma rigidipes Peck, Bull. N. Y. State Mus. 139: 24. 1910.

Pileus fleshy, thin, convex or broadly convex, gregarious, 2.5–5 cm. broad; surface dry, fibrillose-squamulose, tawny-brown, often reddish on the disk; context whitish, with a mild taste; lamellae close, narrow, slightly sinuate, adnexed, brownish-red, becoming dark-purplish-brown or black; spores ellipsoid, apiculate, 10–12 x 6–8 μ; stipe slender, rigid, equal, hollow, fibrillose-squamulose, concolorous or a little paler than the pileus, 5–10 cm. long, 4–6 mm. thick.

TYPE LOCALITY: North River, Warren County, New York.

HABITAT: Damp places among tall herbs.

DISTRIBUTION: New York and Massachusetts.

ILLUSTRATIONS: Bull. N. Y. State Mus. 139: *pl. 3, f. 1–6.*

The spores of Peck's type are slender, smooth, very dark, apiculate, 8.5–10 x 6–7 μ. Two collections made by me in the Adirondacks have spores that are narrower, more inequilateral, and somewhat lighter in color, measuring 9–10.5 x 5 μ. The plants are also much less fibrillose-squamulose, appearing almost glabrous in dried specimens. In spite of these differences, however, I hesitate to separate them as a distinct species.

11. **Drosophila hololanigera** (Atk.) comb. nov.

Hypholoma hololanigerum Atk. Ann. Myc. 7: 371. 1909.

Entire hymenophore covered with dense, long, delicate, whitish, fibrous scales. Pileus ovoid to convex, fragile, gregarious, 2–2.5 cm. broad; surface hygrophanous, watery-brown, becoming pale-ochraceous-buff to pinkish-buff on drying, not striate; lamellae elliptic, adnate, purplish-brown, whitish on the edges; spores subellipsoid, slightly inequilateral, reddish-purple, smooth, 7–9 x 3.5–4.5 μ; cystidia ellipsoid, stalked, 40–50 x 12–15 μ; stipe slender, hollow, fragile, even, white with a very pale pink tint, 6–7 cm. long, 4–5 mm. thick.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On very rotten wood in woods.

DISTRIBUTION: Known only from the type locality.

The type of this species has been destroyed by insects, leaving only the spores, a bit of stipe, and the description.

not easily confused with any poisonous species. Several years ago, after the pine trees had been set out around Conservatory Range 1, a single hymenophore of this fungus was found under one of them. In recent years, I have seen hundreds of specimens there, scattered far and wide beneath the trees, usually appearing in late autumn.

Tylopilus alboater (Schw.) Murrill

Boletus nigrellus Peck

BLACKISH BOLETUS

Plate 2. Figure 2. × 1

Pileus convex, solitary or gregarious, 6–10 cm. broad, 2 cm. thick; surface pruinose to tomentose, very dark brown to black, sometimes rimose-areolate; margin rather thick, involute when young; context white, changing to pinkish-gray when wounded, taste nutty; tubes adnate, slightly depressed, pale-gray to flesh-colored, changing slowly to black or reddish-black when wounded, 1 cm. long, mouths small, irregularly circular; spores oblong-ellipsoid, smooth, pointed at one end, dull-flesh-colored, 10–12 × 4–6 μ; stipe short, subequal, even, concolorous or a little paler than the pileus, pinkish-gray at the apex, velvety at the base, solid, 5–8 cm. long, 1.5–2.5 cm. thick.

This is apparently a rather rare species, originally described from North Carolina and occurring in open deciduous woods or groves from New York to Georgia and Mississippi. Peck found it at Sandlake, New York; and I found it once here under an oak in the rear of the Museum Building and had the accompanying drawing made from the specimens. Other specimens in the herbarium are: New Rochelle, New York, *Miss G. Cannon;* New York Botanical Garden, *A. J. Corbett;* Monmouth County, New Jersey, *Ballou;* Ohio Pyle, Pennsylvania, *Murrill;* Sunburst, North Carolina, *House;* Macon County, Alabama, *Earle;* Ocean Springs, Mississippi, *Mrs. Earle.* Hard figures specimens collected by him in Ohio and states that the species is edible and fairly good.

DOUBTFUL AND EXCLUDED SPECIES

Drosophila atrofolia (Peck) Murrill, Mycologia **4**: 303. 1912. Specimens at Albany, so named by Peck, collected by Lloyd in Ohio, are specifically distinct from the types collected by McClatchie in California.

Hypholoma Candolleanum (Fries) Quél. Champ. Jura Vosg. 115. 1872. (*Agaricus Candolleanus* Fries, Obs. Myc. **2**: 182. 1818.) Given the long name, *Agaricus violaceolamellatus*, by DeCandolle in Flora France **2**: 153, which Fries changed as above. Some claim that it is not distinct from *D. appendiculata*, which often shows violet or purplish colors in its young gills at one stage and has similar spores. Specimens from Bresadola show smooth, broadly ellipsoid or ovoid spores measuring 7–9 x 4–5 μ. At Kew the two species seem exactly the same. Peck says his *H. madeodiscum* differs in having white gills at early stages. He has a sheet with plants from North Greenbush, New York, marked "*H. Candolleanum*. Spores 8–10 x 4–5 μ. *H. velutinum leiocephalum* B. & Br." Also a packet from Mt. McGregor. The characters usually ascribed to *H. Candolleanum* as distinct from *H. appendiculatum* are the violet color of the young gills, the darker color of the pileus, and the striations at the apex of the stipe.

Hypholoma comatum Atk. Proc. Am. Phil. Soc. **57**: 355. 1918. Described from specimens collected at Ithaca, New York, in 1917. Type not seen.

Hypholoma confertissimum Atk. Proc. Am. Phil. Soc. **57**: 355. 1918. Described from specimens collected near Oakland, Maryland, in 1917. Type not seen.

Hypholoma coronatum (Fries) Sacc. Syll. Fung. **5**: 1038. 1887. (*Agaricus coronatus* Fries, Hymen. Eur. 295. 1874.) Reported several times from North America. Authentic specimens show it to be very near *D. appendiculata* (if not that species), with dentiform-appendiculate veil making the margin look like the edge of a crown, as shown in Fries, Ic. Hymen. *pl. 134, f. 3*. Morgan says *H. subaquilum* is *H. coronatum*, but that can not be true, because the spores of the latter measure 7–9 x 3.5–5 μ and are ellipsoid with rounded ends. At Albany, several specimens called *H. coronatum* by Peck are spread on a sheet marked "Menands, N. Y.,

ON CERTAIN ENTOMOGENOUS FUNGI

A. T. Speare

(With Plates 3–5)

I

The Genus Hirsutella of Patouillard

While it is customary to think of the entomogenous fungi as members for the most part of the groups Entomophthorales, Ascomycetes and Fungi Imperfecti, there are in literature several records in which such a habit has been attributed to certain Basidiomycetes. Among the latter may be mentioned the various species of *Septobasidium* and the form called *Hirsutella entomophila* by Patouillard.

The present paper deals with certain fungi that are evidently closely related to the latter. It will be shown, however, that they should not be considered as Basidiomycetes, but rather that they should be looked upon as constituting a rather definite form genus of the Fungi Imperfecti, with which group they must apparently be associated until the perfect stages are found.

The paper by Patouillard (1892) in which *Hirsutella entomophila* is described, although without illustrations, is otherwise quite comprehensive, and there is little doubt in the opinion of the writer that the fungus mentioned is closely allied to members of the group herein considered, and in fact it is looked upon as identical with one of them.

The description of *Hirsutella entomophila* may be quoted in order that it may be readily compared with those of the other species noted below.

"Hirsutella Pat. nov. gen. Hymenomycétes, homobasidiés, en forme de clavaires, simples ou rameux, dressés, rigides, presque coriaces. Hymenium amphigène, disjoint; basides sessile ou presque sessiles; sous-hymenium nul; stérigmates 1–2, subulés, très allongés. Spores incolores.

"*Hirsutella entomophila* Pat. nov. spec. ———. Sur coléoptère adulte; Pallatanga, Equateur, Septembre 1891.

"*Mycelium* émergent du corps de l'insecte sous forme de filaments grêles (2–3 microns) entrelacés en un tomentum gris-cendré. Clavules nombreuses, petites (3–5 mm., de haut), grêles, rigides, simples, cylindracées, aigues et sterile au sommet, d'un gris-violace, blanchâtres a l'extrémité. Basides sessiles ou subsessiles ovoides (8–10 × 5–6 microns); stérigmate unique, subulè, trés allongé, un peu renflé a sa partie inférieure et mesurant 30–45 microns de longueur. Spores hyalines, citriformes, 8 by 6 microns, apicalées aux deux extrémités."

In comparing *Hirsutella* with other members of the lower Clavariaceae, Patouillard observed certain characters of the former such as, for example, the extraordinary length of the sterigmata, the lack of a definite continuous hymenium, the coriaceous consistency of the "clavules," and the complete absence of a subhymenium, that were not shared by any genera of the true Clavariaceae, and suggested because of such differences that a new genus (*Hirsutella*) be formed to receive his anomalous species. In reality the characters noted above are of such a nature that it is difficult to understand why the fungus should have been considered as a Basidiomycete at all. In dealing with the species as a member of this family, however, Patouillard looked upon the inflated base of the sporophore as the basidium, and considered the attenuated distal portion of the same organ as the sterigma, noting that only one of the latter was borne on each basidium. The true nature of the "basidiospores" was apparently not observed for they were described as "citriforme" in shape, whereas, careful microscopic studies of stained and unstained spores by the writer have shown that they are in reality fusiform in outline, although mucus is deposited about the spores in such a way as to render them uniformly lemon-shaped.

In addition to the paper mentioned above, there are in literature several references to fungi of this type which should be mentioned in this connection. Ditmar (1817) described as *Isaria sphaecophila* a fungus occurring on a hornet which shows a certain resemblance to forms herein considered. The illustrations furthermore suggest such a relationship. The spores were said to be globose and hyaline and were entangled among short, rigid hairs which arose at right angles to the synnemata.

Cooke (1892) described as *Isaria saussurei* pro. tem. another hornet parasite. The fungus was originally figured only by

Saussure (1853) but the illustration was later copied by Gray (1858) and still later by Cooke, the latter venturing to give it the name mentioned above. In general appearance it bears a close resemblance to a form on *Polistes* that was brought to the attention of the writer in Hawaii, which is closely allied to *Hirsutella entomophila,* and although no microscopic characters of *I. saussurei* were ever recorded, there seems to be no good reason for considering it different from the Hawaiian and other forms mentioned below.

The writer (1912) considered under the name "Sterile Cordyceps" a fungus that was found upon specimens of *Perkinsiella saccharicida* in Hawaii, and at that time being unfamiliar with Patouillard's paper did not suspect the now evident relationship of this form with *Hirsutella entomophila.*

The description and figures by Vosseler (1902) of *Isaria surinamensis* sp. nov. and *Isaria gracilis* sp. nov., two species occurring on *Amphonyx cluentus* and *Anthophora zonata* respectively, clearly show a resemblance to the fungi herein considered. In gross appearance, in the microscopic structure of the synnemata, both of these forms show characters in common with those of *Hirsutella,* and while the sporophores appear at first sight somewhat different from the analogous organs of *Hirsutella,* it should be noted that in old specimens of the latter only the basal portions of the sporophores persist and that the attenuated terminal portions are somewhat delicate and disappear after the spores are formed. Furthermore, in many instances development of the sporophores seems oftentimes to be arrested so that only the stump like inflated basal portions are formed. In such cases a condition, Plate 3, Fig. 6, is brought about that is quite like that illustrated by Vosseler on his Plate VIII, Figs. 3 and 9.

Vosseler has not made clear either by figures or by text, however, the nature and method of formation of the bodies which he calls the spores. His illustrations of these bodies show no resemblance to the spores of *Hirsutella,* and on account of the fact that he was unable to show how they were formed, it is evident that he possessed old specimens in which the true fruiting stage had disappeared, and that the spores which he described should probably not be associated with the fungi mentioned.

There is little doubt therefore in the opinion of the writer that *Isaria surinamensis* Voss. and *I. gracilis* Voss. (not *Isaria gracilis* Speg.), should be associated with the forms herein considered, but whether or not they are identical with any of the species described below cannot be determined from the data at hand.

Thaxter (1891) described an interesting fungus, *Desmidiospora myrmecophila,* which was found on an ant in Connecticut. While its resting spores are anomolous in character, and although no structures analogous to the synnemata of *Hirsutella* were described, its subulate sporophores and fusoid spores are of the same type as the corresponding organs of the forms under consideration.

In this connection, it should be noted that von Höhnel (1909) agrees with the writer in concluding that fungi of this type should be removed from the genus *Isaria.* He proposed, however, a new genus of Hyphomycetes, *Phaeoisaria,* to include among other things *Isaria surinamensis* Voss., *I. gracilis* Voss. and *I. sphaecophila* Ditm., but it is evident that if any name other than *Isaria* is to be used for fungi of this type it must be *Hirsutella.*

The published information on the subject and the specimens at hand show that such fungi are found upon members of all of the larger insect orders except the Diptera, and Dr. Roland Thaxter, of Harvard University, has informed the writer that he has in his herbarium similar fungi on flies. The hosts, so far as known at the present time, may be noted in detail in the following table.

A glance at this table will show at once that of the specimens at hand the greater part have come from tropical or subtropical regions, and also that the greater number of hosts are found among the Hemiptera, the family Fulgoridae being particularly conspicuous. Furthermore, it will be noted that two of the hemipterous hosts—*Peregrinus maidis* and *Perkinsiella saccharicida*—are pests of considerable economic importance in the localities mentioned.

The illustrations on Plate 3 show the general character of the fruiting stalks or synnemata, which in all of the species but one,

herein considered, are of the same general nature. To the naked eye the synnemata appear as long, simple or branched, often spirally twisted, *Isaria*-like stalks, which at maturity are brownish in color or sometimes almost black. They are more or less rigid in all of the species and retain their form in old preserved specimens. A dozen or more may occur on one host, Plate 5, Figs. 1, 3 and 4, and while in certain cases they appear to arise from a cottony external subiculum, in other instances it is evident that they emerge directly from the body of the host. In the form on *Peregrinus* however, the synnemata do not assume the stilbaceous habit characteristic of the other species, being in this instance little more than papillate or verruciform outgrowths seated upon a noticeably conspicuous external subiculum of hyphae which is itself sporiferous.

	Host	Host determined by	Collected by	Locality
Hemiptera.	Fulgoridae.	E. H. Gibson.	O. H. Swezey.	Auckland, N. Z.
	Fulgoridae.	E. H. Gibson.	J. H. Stevenson.	Rio Piedras, P. R.
	Ricania discalis Walk.	E. H. Gibson.	O. H. Swezey.	Auckland, N. Z.
	Siphanta acula.	O. H. Swezey.	O. H. Swezey, A. T. Speare.	Hawaii.
	Peregrinus maidis	A. H. Ritchie.	A. H. Ritchie.	Jamaica.
	Perkinsiella saccharicida.	?	F. W. Terry.	Hawaii.
Hymenoptera.	*Polistes annularis.*	S. A. Rohwer.	R. W. Leiby.	Raleigh, N. C.
	Wasp.		C. V. Riley?	California.
	"		?	West Virginia.
	Polistes sp.		M. Newell.	Hawaii.
	"	?	(Ditmar) ?(*I. sphaecophila*).	Germany.
	"		Saussure (*I. saussurei*).	
	Anthophora zonata.	?	Gedé ?(*I. gracilis*).	Java.
	Wasp.		Hohnel ?(*I. gracilis*).	"
Coleoptera.	*Diabrotica* sp.	W. S. Fisher.	H. Morrison.	Trinidad, B. W. I.
	Chrysomelidae.	?	Lagerheim.	South America.
Orthoptera.	Cricket.		A. T. Speare.	Hawaii.
Lepidoptera.	*Amphonyx cluentus.*	?	Epp. ?(*I. surinamensis*).	Surinam.

In all of the species the synnemata are composed of numerous somewhat interwoven but nearly parallel septate hyphae that

adhere to one another tenaciously. The character of the fruiting stalk is illustrated on Plate 3, Fig. 1. Certain of the hyphae which lie near the surface of the stalk produce short, usually sessile subulate sporophores and while there is some variation in the shape of these bodies in the different species, they invariably have swollen or inflated basal portions which in all of the forms are surmounted by single extremely long, attenuated sterigmata. It should be noted, however, that many specimens, particularly old ones, do not show such a richly developed sporiferous condition as that illustrated, because development of the sporophores seems to cease in many instances when the inflated basal portions only are formed. Furthermore, after spore formation, the sterigmata often collapse, leaving the swollen basal portions however, in situ, rendering a condition quite comparable to that figured and described by Vosseler for *Isaria surinamensis*.

The spores which are borne singly at the tips of the sterigmata vary from fusoid to allantoid to cylindrical in the different species and are also somewhat variable in size. In all cases a gelatinous substance surrounds them which if carelessly examined might be considered as a part of the spores. That this substance is a secondary product can be determined by examining regions of the synnemata where the spores are being formed. In such positions the newly formed spores are naked and definitely of the fusiform type. Furthermore, if the spores on adjacent sporophores come in contact with one another their matrices coalesce in a manner such as that illustrated on Plate 3, Fig. 16, demonstrating that no cell wall is present.

In all cases the parasitized hosts are fixed to the substrata by undifferentiated rhizoidal hyphae.

As noted in the paper cited above (Speare 1912) it is probable that these forms are the imperfect stages of one or more species of *Cordyceps* or related genera. Actually, however, such a relationship has not been proven in a single instance either by pure culture, continuity of development, association in the same stroma, or other means. Furthermore, while the writer has collected and examined hundreds of specimens of the species which occurs in epidemic form on *Siphanta acuta* in Hawaii, no perfect

stage has been observed, and although specimens of the other parasitized hosts at hand are much more limited in number, an acigerous stage has not been observed in connection with any of them. While therefore it is probably true that these forms are the imperfect stages of *Cordyceps* or an allied type, the condition that is likely to be met with in the future is that mentioned above. This is deemed by the writer as sufficient reason for describing the following imperfect stages, and although recognizing their probable relation to *Cordyceps* it seems advisable for the present to retain the name *Hirsutella* for the genus, members of which are unlike any other described entomogenous forms known to the writer, although in accepting this name care should be taken not to associate it with the Basidiomycetes, with which it evidently is in no way connected. The genus *Hirsutella* should be looked upon in the same manner as is *Gibellula* and other genera that have been removed from the composite genus *Isaria,* and in accordance with this conception the following description may be given.

HIRSUTELLA Pat.

Fruiting bodies in the form of simple or branched, long, erect, slender and rigid, or short verruciform synnemata composed of more or less parallel septate hyphae. Sporophores simple, sessile or subsessile, subulate, the distal portion extremely long and attenuated and sharply set off from the swollen or inflated basal portion. Spores adjointed singly from the tips of the sporophores, fusoid, allantoid or cylindrical in form, hyaline, one-celled, their true shape obscured by a gelatinous substance which surrounds and renders them citriform in appearance.

The specimens in the writer's possession are clearly separable into five species, which are distinguished from one another largely on the characters of the spores and sporophores.

1. HIRSUTELLA ENTOMOPHILA Pat.

Entomogenous. Synnemata arising directly from the body of the host 5–15 mm. long, much branched, rigid, often spirally twisted, brownish in color, sometimes fasciculate with their bases coalescing. Sporophores simple, sessile, the basal portion inflated but short, tapering gradually into relatively short (25–35 microns) sterigmata. Spores fusiform, 7.5×1.5 microns, hyaline, imbedded in gelatinous matrices.

Host: *Diabrotica* sp. (adult) Trinidad.

The above description is based upon a specimen from Trinidad, British West Indies, which is believed to be identical with the form described by Patouillard. The measurements of the spores (8 × 6 microns) as given by this author, apparently included the gelatinous substance surrounding the spores.

2. HIRSUTELLA SAUSSUREI (Cooke) comb. nov.

Isaria saussurei Cooke, pro. tem.

?Isaria gracilis Vos.

Entomogenous. Synnemata arising directly from the body of the host, usually very long (20–30 mm.), flexible, somewhat branched, more or less erect, brownish in color. Sporophores simple, sessile, the basal portion inflated, short, tapering rather abruptly to the usually very long (35–70 microns), slender sterigmata. Spores allantoid, 9–11 × 1–1.5 microns, hyaline, imbedded in gelatinous matrices.

Hosts: *Polistes annularis* (adult), North Carolina.
Polistes sp. (adult), Hawaii.
Polistes sp. (adult), California.
Polistes sp. (adult), British West Indies.

This species is readily distinguished from the others herein described by its long, narrow, and usually allantoid spores, as well as by its extremely slender sterigmata that are but slightly swollen at the base. *I. gracilis* Voss. has been included as a possible synonym but as the description of this fungus includes no discussion of the spores or other microscopic characters it is impossible to treat it more satisfactorily.

3. **Hirsutella floccosa** sp. nov.

Entomogenous. Synnemata short, verruciform, white, arising from a cottony subiculum. Sporophores simple, sessile, extremely robust, the swollen basal portion tapering very gradually into the short, rather stumpy sterigmata (10–15 microns); spores fusoid, hyaline, 9–10 × 3.2–3.8 microns.

Host: *Peregrinus maidis*, Jamaica, B. W. I.

This species is somewhat unlike those described above, in that the synnemata are merely wart-like outgrowths arising from an

external cotton-like subiculum. The spores and sporophores are also larger and more robust than similar bodies of the other species.

It should be mentioned that the characters of the spores and sporophores bear a certain resemblance to the analgous structures of *Acremonium danysz* Wize (1904), a parasite of *Cleonus punctiventris* in Russia.

4. **Hirsutella citriformis** sp. nov.

Entomogenous. Synnemata usually long, flexible, arising sometimes from a subiculum, sometimes directly from the body of the host, brown in color, simple or branched. Branches often short and stumpy, and easily detached. Sporophores simple, sessile or subsessile, with rather short, delicate sterigmata (20–30 microns). Spores fusoid, hyaline, 5.5–8.5 × 1.5–1.8 microns in size, imbedded in gelatinous matrices.

Hosts: Fulgoridae (adult), New Zealand.
Fulgoridae (adult), Porto Rico.
Ricania discalis, New Zealand.
Perkinsiella saccharicida, Hawaii.
Siphanta acuta, Hawaii.

5. **Hirsutella fusiformis** sp. nov.

Entomogenous. Synnemata erect, straight, unbranched, uniform in height, measuring 4–5 mm., nearly black in color, arising from the leg joints and sutures of the host's body, singly. Sporophores simple, sessile, the inflated basal portion tapering gradually to rather short (25–35 microns) sterigmata. Spores fusoid-cylindrical, measuring 9–10 × 2 microns in size, hyaline, imbedded in gelatinous matrices.

Host: Cricket (adult), Hawaii.

It is quite impossible from the data at hand to determine whether or not *Isaria surinamensis* Voss. is identical with any of the above species. In the writer's opinion, however, it undoubtedly is closely related to them and should therefore be placed in the genus *Hirsutella*, and if distinct it should be called *H. surinamensis* (Voss). In a similar manner it is difficult to ascertain the true nature of *Isaria sphaecophila* Ditm., and though

probably this species belongs with the fungi mentioned above, it should perhaps be regarded as a distinct form on account of the knob-like processes which occur upon the synnemata.

II

Synnematium Jonesii gen. et sp. nov.

This fungus was found upon specimens of *Mezira emarginata* Say. and *M. lobata* Say.,* which were sent to the writer by T. H. Jones of Baton Rouge, La.

Although a large number of the insects showed the *Isaria*-like synnemata which characterize the fruiting stage of the organism, other specimens, although dead, showed no external signs of fungus parasitism. The latter were placed in a moist chamber and in a few weeks fruiting bodies of the fungus, Plate 5, Fig. 5, appeared on all but one or two of the individuals.

Artificial cultures on potato agar were readily obtained from the fresh viable material, and at the present time the organism is growing vigorously, although it has been sub-cultured several times since the original isolation in March, 1919.

The fruiting bodies of this form, like those of *Hirsutella,* consist of erect, stilbaceous fascicles of cohering hyphae. When young, Plate 5, Fig. 5, the fascicles are white and the hyphae of which they are composed are loosely coherent, presenting a flocculent appearance such as that illustrated. Later in their development, however, the synnemata are brown in color, and the hyphal elements are more closely associated so that a fully developed fruiting body appears to the naked eye quite like that of *Hirsutella* or like the fruiting stalk of many species of *Cordyceps.*

The structure of the stalk is illustrated on Plate 4, Fig. 1. The sporophores which are produced at the sides and at the tips of the synnemata are long and slender, tapering gradually and uniformly from the base to the tip, in this respect being unlike the homologous organs of *Hirsutella.* Those at the tip of the synnemata, while clearly differentiated from the elements of the

* Determined by Prof. H. M. Parshley through the courtesy of Mr. E. H. Gibson.

stalk, remain closely applied to one another and definitely terminate the growth of the fruiting body. Those at the sides of the synnemata usually occur singly. The spores are abjointed successively from the tips of the sporophores and become incorporated in a mucus like substance that is secreted copiously during the process of spore formation, Plate 4, Fig. 1, in such a way that globular spore masses are produced. The largest of these which are formed at the tips of the synnemata where the sporophores are grouped together are easily observed with the naked eye, and appear at first like the deliquescent, translucent sporangia of certain mucors. Later they become brown or almost black.

In addition to the spores, which are thin-walled and evidently formed for the purpose of infecting other insect hosts when favorable conditions obtain, a second type of reproductive body is produced, the object of which is apparently to tide the fungus over unfavorable conditions. These bodies, the sclerotia, are formed at the tips of certain branches of the synnemata in the manner illustrated on Plate 4, Fig. 3. The method by which they are produced has not been studied in detail, but such observations as have been made indicate that certain of the distal hyphae of the synnemata become twisted, knotted and intertwined about each other in such a way that spherical masses are produced, which after further development assume the appearance of typical sclerotia. These bodies usually appear after spore formation has reached its maximum, or even ceased, and in many instances entire synnemata become involved in their formation so that old tube cultures often contain only the sclerotia, which are formed in large numbers and easily become detached from one another and roll about the tube. At maturity they are brownish in color and roughly spherical, Plate 4, Fig. 6. When crushed, the elements of which they are composed separate from one another readily, and it will be observed that they are very thick-walled, Plate 4, Fig. 7, 9, and irregular in outline. When placed in sterile water, germination may take place at once, although it is obvious that because of their thick walls they are primarily intended to function as resting spores. In germinating,

the cell-wall apparently becomes in part absorbed by the protoplasmic contents of the cell, or at least becomes very much thinner, and a germ tube is pushed out, in the manner illustrated on Plate 4, Figs. 8 and 15, upon the tip of which a thin-walled spore of the type described above is cut off. The sclerotia when placed in a moist chamber produce fascicular hyphal outgrowths as shown on Plate 4, Fig. 5, which produce sporophores, and upon the latter thin-walled spores are abjointed that in every respect are similar to those described above.

The characters of this fungus as outlined above are of such a nature that in the opinion of the writer it cannot be associated with any other known genus of the Hyphomycetes. It is obviously of the stilboid type but the sporophores are borne upon the synnemata acropleurogenously and the spores are abjoined successively becoming incorporated in globular mucous masses, conditions that do not occur in association in any other form known to the writer.

In some respects it is not unlike members of the genus *Stilbum*, some species of which, such as *S. buquetii*, *S. kervillei*, *S. coccophilum*, etc., have furthermore been considered as entomogenous, but as the sporophores in the form under consideration are borne pleurogenously as well as acrogenously, and are well differentiated from the elements of the synnemata, it cannot be associated with the other members of the genus *Stilbum*. On the other hand it bears a certain resemblance to *Hirsutella*, *Sorosporella*, and in a certain degree to *Gibellula*. The characters of *Hirsutella* have been considered in the preceding pages and a glance at Plate 3 will show at once the similarity and at the same time the difference that exists between it and *Synnematium*. In *Sorosporella*, as the writer and others have pointed out, resting spore masses are produced, which although formed within the body of the insect are nevertheless analogous to the sclerotia of *Synnematium*, and furthermore a stilbaceous condition has been observed in *Scrosporella* which is not at all unlike that which occurs in the form under consideration. In general, it may be said that the species of *Hirsutella*, *Sorosporella*, *Gibellula*, and *Synnematium* resemble one another in that the stilbaceous fruit-

ing body is common to all, and, furthermore, with the exception of *Gibellula* a conspicuous bottle-shaped or subulate sporophore is invariably present in some form or modification, while at the same time the fusiform type of spore is present in each instance. It is also to be noted that in all of the above-mentioned genera with the exception of *Gibellula,* a viscous substance is secreted apparently by the spores, which might aid them in attaching themselves to new hosts, which, although not formed abundantly in *Sorosporella,* is supposed to be present because the spores cohere to one another after they are cut off. In *Hirsutella,* in which the spores are abjointed singly, this substance assumes a rather definite form, rendering the spores falsely citriform in outline, whereas in *Synnematium* as has been pointed out, it is secreted copiously and the successively formed spores become incorporated in it, forming large glomerules.

The characters of *Synnematium* are, therefore, sufficiently different from other forms known to the writer to justify a new name and the following description is therefore given.

Synnematium gen. nov.

Entomogenous. Fruiting bodies in the form of erect, dendroid synnemata, arising directly from the body of the host, at first white, later brownish in color. Sporophores borne laterally and terminally on the synnemata, the lateral ones occurring singly, the terminal ones fasciculate, sessile, uniformly and gradually attenuated from base to apex. Spores fusiform, hyaline, one-celled, abjointed successively, cohering in glomerules of mucus at tips of sporophores.

Synnematium Jonesii sp. nov.

Synnemata 5–10 mm. high, 100–200 microns in diam. At first whitish, flocculent, later brown and almost coriaceous, much branched, often tree-like. Sporophores in part arising as lateral branches of the elements of the synnemata, in part forming the terminal growth of the fruiting stalk, in the first instance occurring singly, in the second being fasciculate; in both cases nonseptate and clearly differentiated from the synnemata. Sporophores 40 microns long, gradually attenuate upward from base, which is 3.4 microns in diameter. Spores fusiform, hyaline, one-celled, 8–10 by 4–5 microns, borne successively and cohering after

they are cut off in mucus glomerules. Sclerotia 125–200 microns in diameter, roughly spherical, at first white, later brown in color. Elements of sclerotia very irregular in form but roughly spherical, measuring 10–15 microns in diam. provided with very thick (4–6 microns) walls.

Hosts: *Mezira emarginata* Say, Louisiana, U. S. A.
Mezira lobata Say.

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UNITED STATES DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

EXPLANATION OF PLATES

PLATE 3

Figs. 1–5. *Hirsutella saussurei.* (1) Portion of end of a synnema. × 532. (2) Middle portion of synnema showing method of branching. × 92. (3) Sporophore with attached spore. × 1048. (4) Sporophore. × 1048. (5) Spores.

Figs. 6–9. *Hirsutella fusiformis.* (6) Portion of a synnema. × 568. (7–8) Spores. × 1048. (9) Sporophore.

Figs. 10–11. *Hirsutella floccosa.* (10) Spores. (11) Sporophores. × 1048.

Figs. 12–13. *Hirsutella entomophila.* (12) Sporophore. (13) Spores. × 1048.

Figs. 14–15. *Hirsutella citriformis.* (14) Sporophores and spores from *Ricania.* (15) Abnormal development from *Siphanta acuta.* × 1048.

Fig. 16. Spores of *H. saussurei, H. citriformis,* and *H. fusiformis* imbedded in a mucus-like substance. × 568.

PLATE 4

Synnematium Jonesii

Fig. 1. Terminal portion of a synnema showing (*a*) isolated lateral sporophores, (*b*) massed terminal sporophores, (*c*) mucus glomerules of spores. × 92.

Fig. 2. Terminal portion of a synnema showing a secondary growth arising from beneath the spore mass of the primary growth. × 92.

Fig. 3. Fruiting stalk showing sclerotia in situ. × 50.

Fig. 4. Portion of a synnema with sporophore in situ. × 1048.

Fig. 5. Sclerotium germinating on agar plate culture. × 65.

Fig. 6. Sclerotia. × 92. Fig. 7, cells of sclerotia. × 568. Fig. 8, the same germinating. × 568. Fig. 9, cell of sclerotium. × 1048.

Figs. 10–11. Spore glomerules. × 1048 and × 568.

Fig. 12. Spores. × 1048.

Fig. 13. Spore germinating. × 1048.

Fig. 14. Cells of sclerotium germinating. × 400.

Fig. 15. Single cell of sclerotium germinating. × 1048.

PLATE 5

Fig. 1. *Hirsutella saussurei* (Cooke) on *Polistes annularis*. × ¼.

Fig. 2. *Synnematium jonesii* Speare on *Mezira emarginata*, showing sclerotia. × 4.5.

Fig. 3. *Hirsutella citriformis* Speare on *Siphanta acuta*. × 1.

Fig. 4. *Hirsutella entomophila* Pat. on *Diabrotica* sp. × 1.8.

Fig. 5. *Synnematium jonesii* Speare on *Mezira emarginata*, showing synnemata. × 3.

Fig. 6. *Synnematium jonesii* Speare. Colony of the fungus growing in artificial culture. × 2.5.

BIBLIOGRAPHY

Cooke, M. C. 1892. Vegetable wasps and plant worms, London, p. 53.

Ditmar, L. P. F. 1817. Deutschlands Flora in Abb. nach der Natur von Jacob Sturm, III Abth. Die Pilze Deutschland, 1 Bändschen, Heft 4, p. 115.

Gray, G. R. 1858. Notices of insects that are known to form the bases of Fungoid Parasites, London (privately printed).

von Höhnel, Fr. Fragmente zur Mykologie (VI Mitteilung, nr. 182 bis 288). Sitzungb. d. Math.-Naturw. Klasse d. Kais. Akad. d. Wissensch, Bd. CXVIII, Abt. I, Erster Halbband, p. 275, Wien.

Patouillard, N. 1892. Une Clavarieé entomogene (*Hirsutella entomophila*). Rev. Myc., Tome XIV, p. 67.

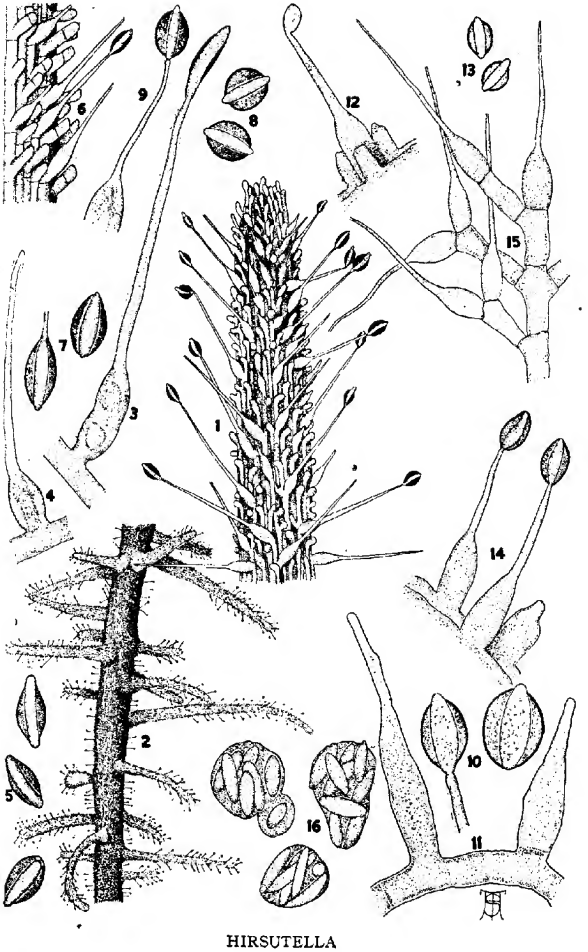
Saussure, H. 1853–8. Mon. des Guepes Sociales, Paris.

Speare, A. T. 1912. Fungi parasitic upon insects injurious to sugar cane. Hawaiian Sugar Planters' Exp. Sta. Path. Ser. Bul. 12, p. 54.

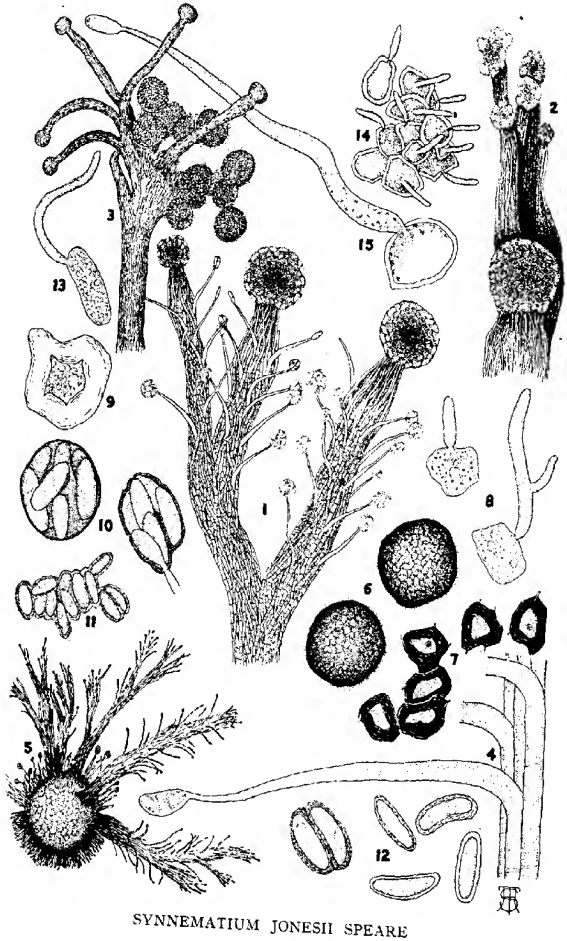
Thaxter, R. 1891. On certain new or peculiar North American Hyphomycetes, II. Bot. Gaz., Vol. XVI, p. 201.

Vosseler, J. 1902. Ueber einige Insektenpilze. Jahreshefte d. ver. f. Vaterl. Naturk. in Württemburg, Bd. 58, p. 380.

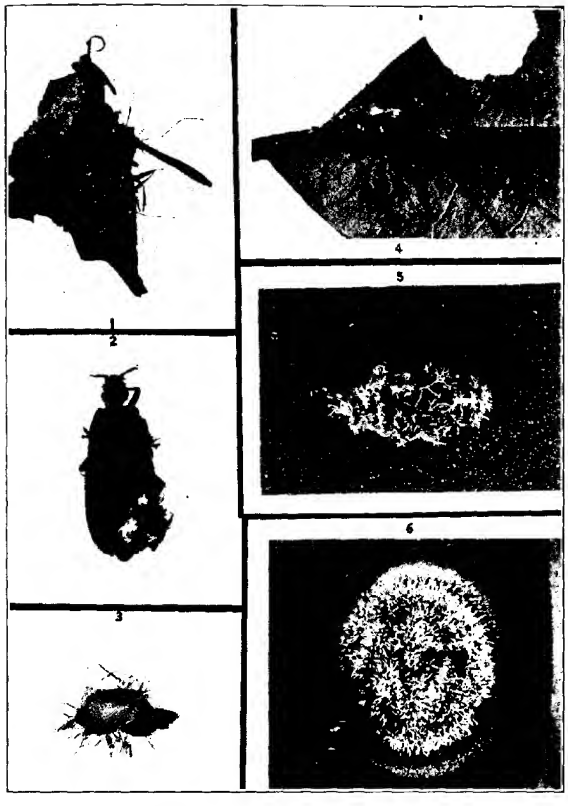
Wize, M. C. 1904. Les maladies du *Cleonus punctiventris* Germ. causées par des champignons entomophytes en insistant particulierement sur les especes nouvelles. Bull. Internat. d. l'Acad. Sci. de Cracovie, 1904, p. 713.



HIRSUTELLA



SYNNEMATIUM JONESII SPEARE



HIRSUTELLA AND SYNNEMATIUM

LIGHT-COLORED RESUPINATE POLYPORES—I

WILLIAM A. MURRILL

In *Mycologia* for September, 1919, preliminary notes were published on 35 species of *Poria* described from North America, and, in the January number, *Trametes serpens* and *Poria medullapanis* were considered. None of Peck's species have been included because these were discussed in detail by Overholts in Bulletin 205–206 of the New York State Museum, published in June, 1919.

It is now my intention to take up various white, gray, yellow, rose-colored, and purple species that occur in temperate and tropical North America and make notes on their history, distinguishing characteristics, hosts, distribution, etc. The object I have in view is not to publish at this time a comprehensive systematic treatment of the group, but to stimulate collectors throughout the country to observe, collect, and study these difficult resupinate forms in the fresh condition, noting spore measurements, colors, and other perishable characters.

The descriptions included are mainly from dried specimens. Before the hundreds of such specimens in the herbarium here can be intelligently discussed, referred to, or classified, they must be named—and more complete descriptions can be prepared later.

The numbers following the collectors' names are those found accompanying the specimens. Sometimes they are only determination numbers and mean nothing except to the collector.

1. PORIA ALABAMAE (Berk. & Cooke) Cooke, Grevillea 14: 113. 1886

Polyporus Alabamae Berk. & Cooke; Berk. & Curt. Grevillea 6: 130. 1878.

Described from specimens collected by Ravenel at Gainesville, Florida, on branches of *Myrica cerifera*. Certain forms of this

species and of *P. medullapanis* resemble each other closely in external appearance. The following specimens of *P. Alabamae* have been examined:

Rav. Fungi Am. *100;* Florida, *Calkins 90, 164, 149, 183, 842, 843, 921, Lloyd 2130* (in part), *Ravenel;* Mississippi; Mexico, *Murrill 679.*

Polyporus roseo-isabellinus and *P. isabellinus,* described by Patouillard and Gaillard from Venezuela in 1888, should be carefully compared with *P. Alabamae.* The spores of the former are said to be ovoid, $6 \times 8 \mu$, while those of the latter are described as ovoid, $13 \times 8 \mu$. Externally, the types are much alike.

2. PORIA VAPORARIA (Fries) Cooke, Grevillea **14**: 111. 1886

It is unfortunate that the type of this species does not exist in the herbarium of Persoon, but it is probably identical with *Polyporus Vaillantii* (DC.) Fries, which Hennings found in pileate form at Berlin and discussed in an illustrated article published several years before his death. This plant is common in the greenhouses of Europe, often appearing in abnormal forms. I have seen no American material to match it closely.

The plant generally called by this name, however, both in Europe and America, is Fries' misconception of Persoon's species. This is abundant with us and is quite well recognized except where confused with certain forms of *Irpex. Polyporus sinuosus* Fries (not *Irpex*), *Physisporus rixosus* P. Karst., *Physisporus serenus* P. Karst., and *Physisporus lutcoalbus* P. Karst. are closely related European species.

The only synonym available for use appears to be *P. incerta,* which is much more appropriate than *P. vaporaria,* since the plant is not common in greenhouses—although any change is unfortunate.

Poria incerta (Pers.) comb. nov.

Polyporus (Poria) vaporarius Fries, Obs. Myc. **2**: 260. 1818.
Not *Poria vaporaria* Pers. Tent. Disp. Fung. **1**: 70. 1797.
Boletus incertus Pers. Myc. Eur. **2**: 106. 1825.

Described from Europe, on dead wood of pine and other trees. Bresadola characterizes it as follows:

"Color ex albido ligneus; pori ampli, rotundati vel angulati, non flexuosi nec daedaloidei; sporae hyalinae, cylindraceo-curvulae, mobiles, $4 \times 1-1\frac{1}{4}\ \mu$; hyphae contextus crassiuscule tunicatae, septatae, ad septa saepe unilateraliter nodosae, $2\frac{1}{2}-3\ \mu$."

This species attacks a variety of hosts, apparently preferring pine, fir, spruce, and other conifers, in the wood of which it produces a brown rot. Other hosts represented in our collection are: American elm, American linden, maple, oak, alder, hickory, beech, white cedar, yellow birch, wild black cherry, orange, and old fruit-bodies of various polypores. The following specimens have been examined:

Ellis & Ev. Fungi Columb. *101, 101b;* Ellis, N. Am. Fungi *9*; Karst. Finl. Fungi, *518*; Rab.-Wint. Fungi Eur. *3434*; Rav. Fungi Am. *711, 712, 713*; Rav. Fungi Car. *19*; Roum. Fungi Sel. *4306*; Sydow, Myc. Mar. *1802*; Poland, *Eichler;* England, *Baker, Carlyle, Cooke, Massee;* Canada, *Macoun 219, 241*; Maine, *Murrill 1745*; Connecticut, *Underwood;* New York, *Cook, Dodge & Seaver, Underwood;* New Jersey, *Anderson, Ellis, Underwood;* Pennsylvania, *Haines & Everhart, Murrill 1299*; Delaware, *Commons 2169*; West Virginia, *Nuttall;* Ohio, *Lloyd 1584, 3129, Morgan 118*; Indiana, *Van Hook 2033*; Missouri, *Demetrio 659*; Arkansas, *Long 19851*; Kansas, *Bartholomew;* Colorado, *Seaver & Bethel;* Iowa, *G. W. Wilson 4*; Idaho, *Weir 71*; Oregon, *Carpenter;* California, *Harper;* Alabama, *Earle 71, Underwood;* Louisiana, *Atkinson (Cornell Univ. Herb. 5123), Langlois 1272, 1886, 2033, 2423*; Florida, *Calkins 541, 738, 799, 862, 923, 924*; *Lloyd 2130*; Bermuda, *Brown, Britton & Seaver 1371*; Cuba, *Earle & Murrill 478, 540, 610*; Porto Rico, *Stevenson 2857, 2915*; Jamaica, *Earle 64, 395, Murrill 340, 668, Murrill & Harris 945*; St. John, *Raunkiaer 190, 207*; St. Croix, *Raunkiaer 174*; Mexico, *Murrill 214, 241, 242, 263½, 631, 635, 660, 998, C. L. Smith 47.*

3. PORIA SUBACIDA (Peck) Sacc.

Among the larger resupinate species having thin-walled, annual tubes, this species described by Peck in 1885 is very common as well as very conspicuous. I have collected it in many forms, in many localities, and on many different hosts, both coniferous and

deciduous. My notes refer to it in the fresh state as "milk-white all over, rather soft," "cream-colored," "fairly soft when fresh and not so yellow," etc.

Both the margin and the hymenium vary from white to yellowish according to age and position on the substratum. There are also thin, tuberculose, vesiculose, and other forms presenting unusual variety in appearance so that it is no wonder that much confusion has arisen regarding the limitations of the species and its relationship. According to Overholts, who has examined the types since I have, the spores are oblong-ellipsoid or ovoid, 4.5–6 × 2.5–3.5 μ, and there are variable cystidia-like structures among the basidia. I have never noticed any prominent subacid odor.

The following named hosts are represented in our herbarium: pine, spruce, Douglas spruce, hemlock, fir, cedar, oak, maple, birch, cherry, and butternut.

Most of the specific names for this plant were published about the same time. The name in common use is retained until a fair degree of certainty can be reached regarding two or more doubtful species. I have a specimen which I collected at Lake Placid in October, 1912, on the underside of a coniferous log, which shows the depressed spots described for *P. ornatus*, but I hesitate at this time to displace *P. acida* simply on page priority without a little more evidence.

PORIA SUBACIDA (Peck) Sacc. Syll. Fung. 6: 325. 1888

?Polyporus induratus Peck, Ann. Rep. N. Y. State Mus. 31: 37. 1879. *Myriadoporus induratus* Peck, Bull. Torrey Club 11: 27. 1884.

?Polyporus ornatus Peck, Ann. Rep. N. Y. State Mus. 38: 92. 1885.

Polyporus subacidus Peck, Ann. Rep. N. Y. State Mus. 38: 92. 1885.

Poria Beaumontill Berk. & Curt.; Cooke, Grevillea 15: 26. 1886.

Poria omoema Berk.; Cooke, Grevillea 15: 26. 1886.

Poria subaurantia Berk.; Cooke, Grevillea 15: 27. 1886.

Peck's species were described from New York and the others

from South Carolina and Alabama. The following specimens have been examined in the herbarium here:

Ellis, N. Am. Fungi *314*; Ellis & Ev. N. Am. Fungi *2803*; Rav. Fungi Am. *107*; Rav. Fungi Car. *20*; Labrador, *Turner;* Canada, *Dearness, Macoun 36, 99, 104, 213, 321, 409, 557*; Maine, *Murrill 2166, 2521, 2522, 2525, P. Wilson;* Vermont, *Burt;* New Hampshire, *Underwood & Cook, P. Wilson;* New York, *Atkinson* (*Cornell Univ. Herb. 4664a, 8272*), *Burnham 9, 10, Jackson* (*Cornell Univ. Herb. 18667*), *Murrill 597, 833, Smith* (*Cornell Univ. Herb. 8231*), *Underwood, P. Wilson;* New Jersey, *Ellis;* Pennsylvania, *Gentry, Sumstine 11, 12, 22*; Virginia, *Long 3778, Murrill 260*; West Virginia, *Ellis 11*; Ohio, *Morgan 334, 575*; Indiana, *Underwood;* Missouri, *Schrenk 8*; Arkansas, *Long 19812*; Kansas, *Bartholomew 1315*; New Mexico, *Long 3759*; Colorado, *Bethel 433*; North Carolina, *Memminger;* South Carolina, *Ravenel;* Alabama, *Earle;* Louisiana, *Langlois 2428, 2431*; Florida, *Calkins 69, 532, 533, 806*; Costa Rica, *Maxon 589*.

4. PORIA GRISEOALBA (Peck) Sacc. Syll. Fung. **6**: 306. 1888

Polyporus griseoalbus Peck, Ann. Rep. N. Y. State Mus. **38**: 91. 1885.

Described as follows from specimens collected by Peck at Osceola, New York, in July:

"Effused, thin, tender, adnate, uneven, scarcely margined, indeterminate, grayish-white, with a thin pulverulent subiculum; pores very minute, subrotund, often oblique.

"The pores are sometimes collected in little heaps or tubercles as in *P. molluscus* and *P. Vaillantii*. In the dried state they are slightly tinged with creamy yellow."

The single collection at Albany is said to be rather scant, with extremely thin fructification. Overholts reports the spores to be oblong or short-cylindric, sometimes curved, often pointed at the base, 4–5 × 1–2 μ. I have not had an opportunity to study the types.

5. PORIA CINEREA (Schw.) Cooke, Grevillea **14**: 111. 1886

Polyporus cinereus Schw. Trans. Amer. Phil. Soc. **4**: 159. 1832.

Described as follows by Schweinitz, who found it frequent on

dead branches of *Liriodendron* and *Juglans* at Bethlehem, Pennsylvania:

"P. longissime effusus, angustatus, albo-marginatus et effiguratus, margine tenui subfimbriato nec tamen byssino. Tubis obliquis brevioribus, poris angustis, subflexuosis. Longitudine 4–6 unciali, ½–1 unciali latitudine. Totus unicolor, eleganter cinereus."

There are no types, either at Philadelphia or at Kew, and no one can say just what Schweinitz included under this name. Morgan reports the species from Ohio and his specimens are preserved (See *P. Caryae*). Ellis was probably influenced by Morgan when he published his exsiccati. It is just possible, though not probable, that *P. cinerea* and *P. Caryae* are synonyms, but there is no way to prove it.

6. PORIA CARYAE (Schw.) Cooke, Grevillea **14**: 111. 1886

Polyporus Caryae Schw. Trans. Amer. Phil. Soc. 4: 159. 1832.

Schweinitz found this species spreading a foot or more over a fallen trunk of *Carya alba* at Nazareth, Pennsylvania. His description—an unusually long one for him—is as follows:

"P. junior tuberculoso-elevatus, interruptus, substantia spongiosa-tomentosa, margine sterili saepe tumido. Demum late effusus, magis aequabilis et subindurescens, margine tunc tenuissimo, submembranaceo, candido, praeditus. Tubis brevibus, parietibus crassiusculis, poris minoribus subrotundis et subflexuosis; interdum regulariter effusis, interdum pulvinatim in tuberculos elevatis. Ex fuliginis cinerascit. Ad pedalem longitudinem sub trunco effusus."

Fortunately, portions of the type are preserved, both at Philadelphia and at Kew, and they appear to match up perfectly with what Morgan called *P. cinereus* Schw. and described as follows:

"Widely effused, adnate, firm; the border narrow, thin, white-fimbriate. Pores small, unequal, subrotund, obtuse, cinereous.

"In woods on the lower side of old logs; common. The whole of a uniform ashen hue except the minute whitish fringe of the border. The growing specimens are somewhat moist, but they shrink little in drying and become quite firm. The pores measure about .20 mm. in diameter. It is an elegant species."

A fine Ohio specimen sent by Morgan to Underwood in 1894 is apparently attached to a portion of a young oak log with the bark still on it. It is now uniformly avellaneous except at the very narrow margin, which is whitish. In the same year, Underwood collected the species at Fern, Putnam Co., Indiana, but never named it.

The specimens issued by Ellis and Everhart as *Poria cinerea* in N. Am. Fungi *2306* were collected by Calkins in Florida, near Jacksonville. They mention No. *440* as a synonym, distributed as *P. argillacea* Cooke. There is a separate specimen so named in the Ellis Collection collected on rotten wood near Philadelphia in November, 1885, by Gentry.

Specimens collected by me (No. *2517*) near Willimantic, Maine, in September, 1905, grew on a dead beech log. They were white with a slight cinereous cast when fresh, and are now avellaneous like those of Morgan.

Caloporus expallescens P. Karst., described from Finland, on birch wood, somewhat resembles this species. Its hymenium is primordial and difficult to compare.

7. PORIA ARGILLACEA (Cooke) Sacc. Syll. Fung. **6**: 321. 1888

Polyporus argillaceus Cooke, Grevillea **7**: 1. 1878.

The type collection was made by Harkness on rotting oak wood in the Sierra Nevada, California, at an altitude of 2,500 feet. A specimen from Harkness in the Ellis Collection was collected on rotten logs of oak at Colfax, which agrees with the Harkness Catalogue. Cooke had two numbers from Harkness, *958* and *1000*, one on oak and the other on *Pinus Lambertiana*. I have seen both at Kew and my notes read: "The one on pine is probably different. Leave it out." As the oak is mentioned first, the specimen growing on it would be the type.

8. **Poria umbrinescens** sp. nov.

Irregularly effused, not always continuous, inseparable, thin. 5 cm. or more broad; margin conspicuous, broad, thin, delicate, sterile, white to slightly yellowish-discolored, consisting of minute, spreading, interwoven mycelial threads; context scarcely

differing from the margin, sometimes almost disappearing with age; hymenium uneven, owing to the inequalities of the substratum, white to yellowish or dirty-white, umbrinous in old and dried specimens; tubes oblique, appearing in patches, at first short, angular, thin-walled, irregular in shape and size, 2–3 to a mm., becoming 3 mm. in length, with long, lacerate dissepiments, soon discoloring, weathering, and falling away with age; spores copious, subglobose to ovoid, smooth, pale-umbrinous under the microscope, 4-6 μ long; cystidia none.

Type collected on a wet palm stump at Constant Spring Hotel, near Kingston, Jamaica, December 13, 1908, *W. A. & Edna L. Murrill 41*. It is rather surprising to find dark-colored spores on a plant of this character, but this accounts for the tubes becoming umbrinous with age.

9. **Poria lacticolor** sp. nov.

Irregularly effused for several centimeters, becoming continuous, inseparable, very thin; margin conspicuous, pure-white, unchanging, very thin, delicate; context white, a mere membrane; humenium even, pure-white, unchanging with age or on drying; tubes oblique, angular, thin-walled, short, 4 to a mm., concolorous within, with long, toothed dissepiments; spores not found.

Type collected on a dead log in a virgin forest at Ciego de Avila, Puerto Principe Province, Cuba, March 21, 1905, *F. S. Earle & W. A. Murrill 636*. Also collected on rotten wood at Belmont, St. George's, Grenada, September 22, 1095, *Broadway*. This species somewhat resembles a coating of whitewash with fine lines in it made by the brush.

10. **Poria niveicolor** sp. nov.

Occurring in small, irregular patches about 3 cm. in diameter, inseparable, thin; margin conspicuous, thin, pure-white, cottony, rarely connected with rhizomorphic strands, becoming somewhat elevated with age or on drying; context thin, white, similar to the margin; hymenium quite even, becoming continuous, snow-white when fresh, with a very faint rosy-avellaneous tint in dried specimens; tubes very short, regular, angular, thin-walled, entire, 5 to a mm.; spores hyaline.

Type collected on well-rotted wood in Troy and Tyre, Cockpit

Country, Jamaica, January 12–14, 1909, *W. A. Murrill & W. Harris 1056*.

11. **Poria cremeicolor** sp. nov.

Broadly effused for many centimeters over the smooth surface of the substratum, continuous, inseparable, thin; margin conspicuous, indefinite, very thin, cremeous; context like the margin, a mere membrane; hymenium even, not glistening, uniformly cremeous, becoming very slightly darker in dried specimens; tubes regular, rounded to somewhat angular, firm, becoming thin-walled but remaining entire, less than 0.3 mm. long, 5 to a mm.; spores hyaline.

Type collected on small, hard, decorticated hardwood stems in Troy and Tyre, Cockpit Country, Jamaica, January 12–14, 1909, *W. A. Murrill & W. Harris 863*.

12. **Poria adpressa** sp. nov.

Irregularly effused for many centimeters over decorticated wood, inseparable, thin, following closely the inequalities of the surface and also occupying the crevices and depressions; margin conspicuous, thin, white to slightly yellowish, closely appressed; context thin, white; hymenium appearing in patches and then becoming fairly continuous, uneven, not glistening; tubes very oblique, arranged as in oblique-tubed forms of *Coriolellus sepium* but much smaller, about 4 to a mm., larger by confluence, firm, rather thick-walled, entire on the edges; spores hyaline.

Type collected on well-rotted, decorticated wood at Rio Gavelan, Province of Santa Clara, Cuba, March 26, 1910, *Britton, Earle & Wilson 6033*. This species has the habit of *Coriolellus sepium* when growing resupinately on an upright trunk or stump, but the tubes are minute and there is no tendency to form a pileus. Young specimens collected on corticated wood in Cuba (*Earle & Murrill 167*) and in St. John (*Raunkiaer 204*) appear to have the same kind of hymenium, but its color is slightly rosy-avellaneous, which leaves the identity of these specimens in doubt.

13. **Poria tenuipora** sp. nov.

Effused for many centimeters, covering large areas, continuous, inseparable, thin; margin cottony, pure-white even in dried

plants, inconspicuous, scarcely visible in age; context white, too thin to measure, being a mere membrane holding the tubes together; hymenium quite even, white, cremeous where bruised, with a slight rosy-avellaneous tint in dried specimens; tubes rather rigid, oblique, regular in shape and size, reaching 1 mm. in length, concolorous within, thin-walled, the mouths rounded, entire, exceedingly minute, 10 to a mm.; spores minute, hyaline.

Type collected on much-decayed wood in Troy and Tyre, Cockpit Country, Jamaica, January 12–14, 1909, *W. A. Murrill & W. Harris 855*. Also collected on a standing rotten stub in woods at Mooretown, Jamaica, November 22, 1902, *F. S. Earle 541*; and on rotten wood in the forest at Alto Cedro, Cuba, March 19–20, 1905, *F. S. Earle & W. A. Murrill 518*.

14. **Poria Earlei** sp. nov.

Widely effused, continuous, inseparable, about 4 mm. thick; margin inconspicuous, delicate, pure-white, scarcely apparent in older specimens; context white, practically disappearing with age; hymenium even, regular, glistening, milk-white, becoming very faintly yellowish in dried specimens; tubes angular, quite regular, white within, very thin-walled, entire to somewhat toothed, 4 mm. long, 5–7 to a mm.; spores scanty, ellipsoid, rather blunt at the ends, smooth, hyaline, $5 \times 3.5\ \mu$.

Type collected on a rotten log on Rose Hill, Jamaica, 4,000 feet elevation, October 30, 1902, *F. S. Earle 297*. This species has longer and larger tubes than *P. tenuipora*, and they glisten distinctly when turned from side to side in the light.

15. **Poria corioliformis** sp. nov.

Irregularly effused over fallen leaves and the surface of decayed twigs in continuous areas 1–2 cm. wide, inseparable, not very thin, following to some extent the irregularities of the substratum; margin conspicuous, broad, finely tomentose, white to cremeous, elevated at times as though about to project as a narrow pileus; context similar to the margin and quite conspicuous; hymenium somewhat uneven, cremeous, glistening; tubes quite regular, rounded to somewhat angular, 1–1.5 mm. long, cremeous within, rather firm and thick-walled for the genus, entire on the edges, 4–5 to a mm.; spores subglobose, smooth, hyaline, $4\ \mu$.

Type collected on fallen leaves and twigs in woods along the river at San Antonio, Cuba, April 20, 1903, *J. A. Shafer 253*. This may be a resupinate form of an undescribed species of *Coriolus,* closely related to *C. depauperatus,* but with smaller tubes.

16. **Poria regularis** sp. nov.

Forming small, rather thin patches 2 cm. or less wide, which are continuous as far as they go and do not readily separate from the substratum; margin a thin membrane of white mycelium connected with rhizomorphic strands and apparently disappearing entirely with age, leaving simply a mass of tubes; context thin, white, not apparent in age; hymenium very even and uniform, not glistening, milk-white, unchanging; tubes regular, angular, thin-walled, entire, reaching 0.5 mm. in length, 4–5 to a mm.; spores hyaline.

Type collected on a fallen, dead, corticated branch of some hardwood tree at Morce's Gap, Jamaica, a very wet locality 5,000 feet above sea-level, December 29, 30, January 2, 1908-9, *W. A. & Edna L. Murrill 703*. The abundance of moisture present probably had something to do with the unusual form of the hymenophore.

17. **Poria polyporicola** sp. nov.

Effused almost continuously for many centimeters over the hymenium of an old polypore, inseparable, very thin; margin pure-white, exceedingly thin, diffuse, becoming discolored with age; context not apparent; hymenium closely applied to the tubes of the polypore, regular, even, white to pale-avellaneous-umbrinous; tubes exceedingly shallow, thin-walled, entire, rounded to angular, white to slightly yellowish, 4–5 to a mm.; spores hyaline.

Type collected on an old hymenophore of *Pogonomyces hydnoides* growing on a cypress log near Fort Myers, Florida, February 29, 1916, *Paul C. Standley 12895*. Among the tubes are numerous sporophores of a minute brown species of *Orbilia,* which apparently has something to do with their discoloration.

18. **Poria cinereicolor** sp. nov.

Effused for several centimeters over the surface and hymenium of an old polypore, continuous, inseparable, very thin; margin

like a delicate gray cobweb on which the tubes appear in patches and then become continuous, when the mycelium and context practically disappear; hymenium ash-colored, unchanging, very even, regular, not glistening; tubes very short, rounded to angular, entire, rather thick-walled at first, 7–8 to a mm.; spores hyaline.

Type collected on both the upper and lower surfaces on an old specimen of *Ganoderma* in Castleton Gardens, Jamaica, December 14, 1908, *W. A. & Edna L. Murrill 63*. This species forms a very striking contrast with its mahogany-colored host.

19. **Poria subavellanea** sp. nov.

Effused in rather thin patches 3–5 cm. or more long on the underside of corticated or decorticated pine logs; margin conspicuous, pure-white, unchanging, cottony, thin, sometimes elevated, with a tendency to separate from the substratum; context thin, white, hardly apparent in age; hymenium uneven, continuous, glistening, pale-avellaneous; tubes firm, thin-walled, entire, angular, 1–2 mm. long, 4 to a mm.; spores very scanty, ovoid, smooth, hyaline, about 4 μ long.

Type collected on pine bark at Auburn, Alabama, November 20, 1897, *F. S. Earle 121*. Also collected on a decorticated log of *Pinus echinata* near Womble, Arkansas, November 6, 1915, *W. H. Long 19811*. This species might be a resupinate form of some undescribed species of *Coriolus*.

20. **Poria subcorticola** sp. nov.

Effused for several centimeters, thin, inseparable, continuous; margin conspicuous, rather thick, persistent, white to cream-colored; context similar to the margin, persistent, apparent as a paper-thin membrane; hymenium even, white to cream-colored, not glistening, appearing in patches and finally becoming continuous; tubes mostly primordial, very shallow, angular, rather thick-walled, entire, 4–5 to a mm.; spores hyaline.

Type collected on much-decayed decorticated wood at Cuernavaca, Mexico, December 24–27, 1909, *W. A. & Edna L. Murrill 363*. Also collected on the underside of an old fruit-body of *Coriolopsis fulvocinerea* at Colima, Mexico, January 3–4, 1910, *W. A. & Edna L. Murrill 584*. The hymenium resembles that of *Poria corticola*.

21. PORIA VULGARIS (Fries) Cooke, Grevillea 14: 109. 1886

Polyporus vulgaris Fries, Syst. Myc. 1: 381. 1821.

Fries found this species very common throughout the entire year on fallen wood of pine and other trees, as well as upon leaves. He describes it as follows:

"Longe effusus, tenuis, siccus, laevis, albus, poris exiguis aequalibus.

"Ad longitudinem usque pedalem effusus, laevis, ½ lin. crassus, detritus immutabilis, nec nisi in frustulis a ligno separabilis; margine praecipue junioris tenuissime pubescente. Pori recti vel obliqui, subrotundi."

In Saccardo's "Sylloge" it is reported on the wood of various hardwood trees and conifers from widely separated temperate and tropical regions. Bresadola discusses the species at length in his paper on fungi collected in Hungary and finds it difficult because it is so frequently sterile. He states that *Polyporus luteoalbus* P. Karst., occurring on fir wood and always sterile, is *P. vulgaris* Fries of the "Systema"; and that *forma calcea* of Fries is also sterile. The typical form, according to him, occurs on the wood of frondose trees and is always fertile, the spores being obovoid, hyaline, $3.5\text{–}4 \times 2\text{–}2.5\,\mu$. I have good specimens from him of this form and can match them fairly well with American material, although the species cannot by any means be called *common* with us.

I have seen the specimens in the Fries Herbarium, which are not very satisfactory, and have one sent by him to Massee, which agrees for the most part with those from Bresadola. If we accept Bresadola's interpretation, we have a species with regular, glistening tubes, which are smaller and usually shorter than those of *P. subacida* and do not become so yellow with age or on drying. From *P. vaporaria,* it differs decidedly in microscopic characters and the tubes are easily distinguished. *P. mollusca* is much softer and yellower, although Fries included it as his variety *lutescens.*

The following specimens, mostly European, have been examined in the herbarium here. A good hunt would doubtless bring more to light.

Romell, Fungi Scand. *16;* Sydow, Myc. Mar. *2201, 2814, 3422;* Thüm. Myc. Univ. *1503;* Wart. & Wint. Schweiz. Krypt. *719;* Sweden, *Fries;* Finland, *Karsten;* England, *Plowright;* Hungary, *Kmet;* New Jersey, *Ellis 348;* Pennsylvania, *Murrill 1094;* West Virginia, *Nuttall 909.*

22. **Poria Amesii** sp. nov.

Effused for several centimeters, continuous, inseparable, 2–5 mm. thick; margin narrow, white, unchanging, at first cottony, fimbriate, and appressed, becoming membranous and elevated, rarely slightly reflexed; context very thin but visible under a lens as a gelatin-like membrane quite distinct in color from the milk-white tubes; hymenium even, continuous, glistening, white, unchanging, having normal tubes in places and elsewhere being entirely cellular and abnormal; tubes, when normal, very delicate, thin-walled, angular, subentire, 2–3 mm. long, 5–6 to a mm.; spores very abundant, ovoid, smooth, hyaline, $3 \times 2\,\mu$.

Type collected on decorticated or burnt maple wood and on the hymenophores of another species of *Poria* at Valley Stream, Long Island, *Frank H. Ames 340.* These specimens were sent to me by Mr. Ames without date of collection shortly before his death.

23. **Poria subcollapsa** sp. nov.

Effused for several centimeters, covering small or large areas according to conditions, usually continuous, inseparable, thin; margin ordinarily very delicate, whitish, soon becoming inconspicuous, but at times rather broad and persistent; context similar to the margin, inconspicuous; hymenium not glistening, white and even when young, becoming pale-rosy-avellaneous and irregular, owing to the formation of many larger openings by the confluence of the pores; tubes oblique, rounded to angular, thin-walled, 4–5 to a mm., with slightly elongate, delicate dissepiments, which collapse to some extent with age; spores hyaline.

Type collected on a fallen dead stick at Rose Hill, Jamaica, October 24, 1902, *F. S. Earle 68.* Also collected on banana trash at Rio Piedras, Porto Rico, February, 1914, *J. A. Stevenson 1465.*

24. **Poria monticola** sp. nov.

Effused over large areas, continuous, inseparable, 1–3 mm. thick; margin thin, appressed, fimbriate to membranous, usually

narrow and practically disappearing with age, but at times rather thick and felty, reaching 5 mm. broad; context very thin, white, inconspicuous with age; hymenium very even, continuous, glistening, white or tinged with yellow, often showing brownish stains in dried specimens where touched with the fingers or near the margin where the tubes are young; tubes annual, large, rigid, 1–3 mm. long, rounded or somewhat angular, entire, 2–3 to a mm.; spores copious, narrowly-ellipsoid, often slightly curved and apiculate at the base, smooth, hyaline, 5–6 × 3 μ.

Type collected on a decorticated log of *Pinus monticola* at Priest River, Idaho, *J. R. Weir 61*. Also on the same host in the same locality, *J. R. Weir 57, 72, 77;* on dead wood of *Pinus monticola* at Agassiz, British Columbia, *J. R. Weir 65;* and on dead wood of *Picea Engelmanni,* probably from Priest River, Idaho, *J. R. Weir 63*. All of these specimens are very uniform in appearance and represent the species in excellent fashion.

25. **Poria lacerata** sp. nov.

Effused for several centimeters, continuous, inseparable, thin; margin cottony or felty, appressed, milk-white, unchanging, narrow, practically disappearing with age; context a mere white membrane; hymenium even, continuous, milk-white, staining yellowish-brown where bruised in handling; tubes rather long, delicate, thin-walled, angular, becoming fimbriate-lacerate at maturity, 2 mm. long, about 3 to a mm.; spores copious, ellipsoid, smooth, hyaline, usually uniguttulate, 6 × 3.5 μ.

Type collected on a well-rotted, decorticated log of *Quercus alba* near Womble, Arkansas, November 7, 1915, *W. H. Long 19777*. Described from a good specimen sent me by Professor Long, who refers to another number collected by him which I have not seen.

26. **Poria rimosa** sp. nov.

Effused for a few centimeters but interrupted by the irregularities of the substratum, inseparable, thin; margin very thin, membranous, milk-white and unchanging in the early stages, becoming cremeous and more felty when older, always appressed; context white, inconspicuous in age; hymenium appearing in patches, at length continuous, but soon cracking transversely every few millimeters, white with a cremeous tint to dull-cremeous; tubes about 1 mm. long, oblique, thin-walled, angular, entire,

4 to a mm.; spores scarce, narrowly-ovoid, smooth, hyaline, $5 \times 2.5 \mu$.

Type collected on a well-rotted, decorticated log of *Juniperus monosperma* near the Gila National Forest, New Mexico, October 23, 1911, *W. H. Long & G. G. Hedgcock*. This is said by the collectors to be common, but I have only this one packet, which is without a number.

27. **Poria heteromorpha** sp. nov.

Effused for many centimeters, continuous, usually separable because the substratum is much decayed, quite thick; margin conspicuous, thin, cottony, white, becoming fulvous with age; context thin, similar to the margin; hymenium uneven, continuous, white when young, ochraceous or fulvous with age, usually reviving; tubes large, thin-walled, entire, somewhat collapsing, 1–2 mm. long, 2 to a mm., becoming much elongated with age in oblique positions, the long undulate dissepiments resembling lamellae; spores copious, subglobose to broadly ovoid, uniguttulate, smooth, hyaline, 3–4 μ long, 5 μ in the Florida specimens.

Type collected on very rotten wood in Troy and Tyre, Cockpit Country, Jamaica, January 12–14, 1909, *W. A. Murrill & W. Harris 857*. Also collected at the same time and place by *W. A. Murrill & W. Harris 865;* on very rotten wood near Port Antonio, Jamaica, December 17, 1908, *W. A. Murrill 188;* on very rotten wood at Rio Piedras, Porto Rico, July 26, 1915, *J. A. Stevenson 2891;* and on dead leaf-stalks of *Sabal Palmetto* near Ocala, Florida, August 11, 1913, *W. H. Long 12360*.

This is a species of very unusual appearance, with a hymenium varying from poroid to somewhat dacdaleoid and reminding one of *Lenzites heteromorpha*. It likes wood almost reduced to humus and can be stripped off in large flakes, which are soft, flexible, and very light in weight. After the old hymenophores are discolored and appear dead, patches of fresh white tubes will arise from portions of the hymenial surface. This frequently happens, however, with annuals in tropical countries and may be due to the recurrence of rains.

NEW YORK BOTANICAL GARDEN.

NOTES ON NORTH AMERICAN HYPOCREALES—IV. ASCHERSONIA AND HYPOCRELLA

F. J. Seaver

(With Plate 6)

The perfect stage of *Aschersonia turbinata* was recently described by Dr. Roland Thaxter,[1] but the generic position of the fungus was left an open question. In that paper Dr. Thaxter states that so far as he knows no ascosporic condition has previously been observed in any of the group (*Aschersoniae*). After a study of the tropical material and literature at hand, the writer is convinced that this apparent failure to detect the perfect stage of this genus is due not so much to its absence as to the fact that whenever the perfect stage is found, the fungus is at once and quite properly referred to some other genus, to *Hypocrea* by early writers and to *Hypocrella* by more recent ones. In fact there seems to be little more reason for describing the perfect stage of this fungus under the name of *Aschersonia* than for describing a *Cordyceps* under the name of *Isaria*, although the *Isaria* stage is usually mentioned when it is known. That the connection between *Aschersonia* and *Hypocrella* has been observed and noted in literature will be pointed out later on.

The attention of the writer was first called to this matter several years ago while attempting to determine a collection of tropical fungi. One specimen collected by A. A. Heller in Porto Rico in 1900 was found to have linear spores and was labeled *Hypocrella* sp. and filed away under the new and noteworthy species of Hypocreales, since it had been overlooked in the work on the Hypocreales of North America. The same species was collected by Dr. B. Fink in Porto Rico in 1915 and doubtfully referred to *Hypocrella filicina* Rehm, although the stroma is white instead of

[1] Bot. Gaz. 57: 308–313. 1914.

black as described by Rehm. The blackening might easily be due to age and weathering. Many other tropical specimens have been studied which are apparently the same but in which the perfect stage is lacking. These have been referred to *Aschersonia.*

Recently, since taking up a study of Porto Rican fungi, these facts have again forced themselves to the front and more attention has been given to the matter. In looking over the literature of the subject I find that *Hypocrea phyllogena* Mont.[2] which was doubtfully recorded for North America in *North American Flora* has every appearance of being the perfect stage of an *Aschersonia* as recently described by Thaxter. The capitate apex of the ascus which is characteristic of the perfect stage of *Aschersonia* is especially evident in Montagne's illustration. When several years after the description of *Hypocrea phyllogena,* Montagne founded the genus *Aschersonia,*[3] it was said to be related to *Hypocrea* (which at that time included *Hypocrella*) and was described as representing the *Hypocreae* in which the asci are wanting, or what is now known as the pycnidial stage of the *Hypocreae.* It is even not unlikely that the type of *Aschersonia, Aschersonia tahitensis* Mont., is the pycnidial stage of his own *Hypocrea phyllogena.*

From the above facts and the observations which have been made on the tropical specimens in the collections of the garden, it seems evident that the genus *Aschersonia* represents the pycnidial form of *Hypocrella* and that *Hypocrella phyllogena* (Mont.) Speg. which was described eight years before the genus *Aschersonia* was proposed really represented the perfect stage of an *Aschersonia* as now known. *Aschersonia* would then occupy the same relation to *Hypocrella* as *Isaria* to *Cordyceps.*

In looking over the literature of the subject I find that this connection has not been entirely overlooked by previous authors. In 1900, Raciborski[4] gave a detailed description of *Hypocrella discoidea* (Berk. & Br.) Sacc. (the type of the genus *Hypocrella*). This was reported by him on *Elettaria* and *Amomum.* In a note

[2] Ann. Sci. Nat. II. 13: 340. 1840.

[3] Ann. Sci. Nat. III. 10: 121. 1848.

[4] Parasit. Algen und Pilze Java's 3: 22–23. 1900.

on this species he refers to a snow-white, otherwise similar species of *Hypocrella* (?) which grows abundantly on *Elettaria* stems. In this form, however, he says that only the conidial form (*Aschersonia*) has been found by him. In 1909 von Höhnel[5] described *Hypocrella cretacea* and calls attention to the fact that this probably represents the perfect stage of the *Aschersonia* mentioned by Raciborski in the article referred to above. It should not be overlooked that Raciborski has noted the similarity in habitat and all external characters except color to *Hypocrella discoidea*, the type of the genus *Hypocrella* so that we at least have reason to suspect that the genus *Hypocrella* itself was founded on the perfect stage of an *Aschersonia*. *Hypocrella cretacea* von Höhnel may be found to be identical with *Hypocrella discoidea* (Berk. & Br.) Sacc. as described by Raciborski.

In the absence of suitable material it is difficult to determine the identity of our own species with any degree of certainty. The one collected by Heller agrees well with *Hypocrella cretacea* von Höhnel, as collected by von Höhnel and distributed by Rehm in his Ascomycetes *1870*. As already mentioned this may prove to be identical with *Hypocrella discoidea* (Berk. & Br.) Sacc. to which it is said to be similar, although Raciborski claims that the latter species differs from other species of *Hypocrella* in the fact that the spores do not break up into segments. This apparent difference may be due to the age of the specimens and may not prove to be of specific value although considerable importance has been attached to it. Just how *Hypocrella discoidea* differs from *Hypocrella phyllogena* (Mont.) Speg. it is impossible to know in the absence of authentic material of the latter species.

It is difficult to find conidia in the mature stromata. In most specimens, however, the younger stromata show an abundance of conidia. As these are usually found loose in large numbers, their method of attachment is not easily detected. The individual conidia appear to be rather small, ellipsoid bodies which taper into a bristle-like apiculus at each end. Although they are guttulate and granular and sometimes pseudoseptate, no true septum could be detected. In the absence of asci, the presence of this par-

[5] Sitz.-ber. Akad. Wissen. Wien. 118: 311. 1909.

ticular type of conidia together with the white discoid stromata are regarded as of specific importance, although the conidia could not be found in the authentic specimen of *Hypocrella cretacea* examined, all of the stromata in which were ascigerous.

In looking over our collections, nine specimens collected by H. H. Whetzel and E. W. Olive (Nos. *716–724* inclusive) are found to represent the conidial stage of what is here referred to as *Hypocrella cretacea.* All so far as examined show the typical stromata and conidia but none so far as discovered contain asci. All are reported on some species of *Adiantum.* The same form was collected by F. L. Stevens on fern. The specimen collected by B. Fink which shows both asci and conidia has already been mentioned. An abundance of the conidial stage of the fungus was collected by N. L. Britton, J. F. Cowell and Stewardson Brown (No. *5250*), also, on some fern. While the species appears to be more common on ferns, what appears to be the same species was collected by L. M. Underwood and F. S. Earle in Cuba on the leaves of some flowering plant. Since the fungus is entomogenous, it would naturally be dependent on the insect host rather than the plant host. The latter however might be restricted in its occurrence to certain plant hosts. This is one of the questions which needs careful investigation.

If our conclusions are right regarding the connection of *Aschersonia* and *Hypocrella,* the form for which Thaxter recently described the ascigerous stage, assuming that this is specifically distinct, as it appears to be, would be a *Hypocrella.* It should then become **Hypocrella turbinata** (Berk.) comb. nov.

Another very interesting form with its ascigerous stage has been encountered in our collections distributed by Sydow in Fungi Exotici Exsiccati *84,* under the name of *Hypocrella salaccensis* (Racib.) Petch (in litt.). The specimen examined was collected in the Philipines by P. W. Graff. This species was originally described by Raciborski under the name of *Barya salaccensis.*[6] In this species, according to its author, the spindle-shaped conidia are formed after the fashion of an *Aschersonia.* These are followed by the perithecia which are so prominent that they appear

[6] Bull. Acad. Sci. Cracovie 1906: 909.

almost superficial. The capitate ascus is a very conspicuous character in this species and the segmentation of the spores is much more conspicuous than in the previous species.

Another species with its perfect stage was collected by J. R. Johnston and J. A. Stevenson at Naguabo, Porto Rico, March 9, 1914, No. *1640*. This species is said by the collectors to occur on white fly and was collected on the leaves of *Bignonia unguis* L. In this species, which will be here designated as **Hypocrella disjuncta** sp. nov., the stromata are tuberculate and slightly constricted at the base. They are perched on the rather large ellipsoid scale so that the insect itself is distinctly visible, serving as a substratum for the stroma. The stroma becomes dull-grayish when mature. The capitate apex of the ascus is small since the ascus itself is constricted at the apex and strongly swollen near the center. While the spores are evidently filiform when young, they very soon break up into their component parts, which become so disjuncted and disheveled that the older ascus appears to be polysporous with little hint of their real filiform character. This is very different from *Hypocrella cretacea* in which the filiform spores may be easily seen protruding from the broken ascus.

Still another Porto Rican species was collected by H. H. Whetzel and E. W. Olive at Maricao on the leaves of *Inga laurina* Willd., No. 734. This was labeled *Aschersonia* sp. Later, on a more careful examination, some of the stromata were found to contain asci and the species was referred to *Hypocrella guaranitica* Speg., since it seems to agree well with that species as distributed by Balansa in Plantes du Paraguay, No. *3146*. The stromata in this species are tubercular, rather conspicuous and become black at maturity. The species grows on a circular scale which is almost completely obscured at maturity.

Hypocrella Tamoneae Earle, which was published by the writer in the "Hypocreales of North America," was again collected by H. H. Whetzel and E. W. Olive at Maricao, No. *472*. This was said by the collectors to occur on scale insects (?). While this species has all of the characters of a *Hypocrella* its entomogenous character is much less evident than in the other species studied, although as noted above its entomogenous character was sus-

pected by the collectors before its identity was known. The stromata seems to be more firmly attached to the leaf than those of the other species studied. It appears to occur on some kind of an insect spot.

In 1891, Patouillard[7] called attention to the fact that *Hypocrea viridans* Berk. & Curt. is an *Aschersonia*. This species was included in *North American Flora* as a doubtful species. This again emphasizes the similarity between *Hypocrea* (then including *Hypocrella*) and *Aschersonia*.

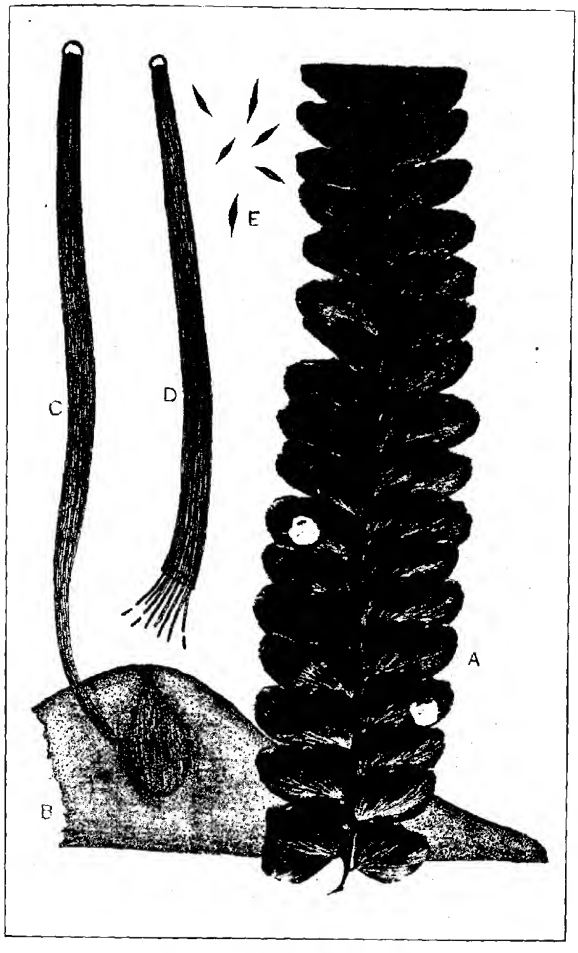
Since most if not all of the species of *Hypocrella* are entomogenous it may be that the various species of the genus will prove to be of economic importance in combating harmful insects, since two species of *Aschersonia* have already been employed in Florida for this purpose. A critical study of the species of *Hypocrella* in the tropics together with the insects which they parasitize might reveal new insect enemies which could be used for this purpose in our own states. This would at least furnish an interesting field for investigation.

NEW YORK BOTANICAL GARDEN.

EXPLANATION OF PLATE 6

Hypocrella cretacea.—*A*, photograph of fern leaf with two stromata; *B*, diagram section of stromata showing perithecium; *C*, ascus with spores; *D*, broken ascus with protruding spores; *E*, conidia; *C–E*, drawn with camera lucida.

[7] Bull. Soc. Myc. Fr. 7: 48. 1891.



HYPOCRELLA CRETACEA VON HÖHNEL

TWO NEW TRUFFLES

HELEN M. GILKEY

Tuber canaliculatum sp. nov.

Tuber Borchii Kauffman non Vittad. Rep. Mich. Acad. Sci. 12: 216. 1910.

Ascocarp brown, surface conspicuously covered with small, low, polygonal papillae; veins conspicuous, whitish; cortex pseudoparenchymatous with outermost cells sometimes arranged in hyphae more or less parallel with surface of ascocarp, sometimes projecting beyond surface as hairs; pseudaparenchymatous layer changing to somewhat irregularly arranged coalescent hyphae, becoming less connected toward hymenium; thickness of peridium 360–520 μ; venae internae small and inconspicuous to almost wanting, consisting of unconnected somewhat irregularly arranged hyphae, latter 4–6 μ in diam.; tissue between asci of similar structure, but hyphae bordering venae externae becoming distinctly parallel, some ending at margin of vein as more or less regularly arranged, somewhat swollen-tipped paraphyses, others continuing inward to form loose, interwoven tissue filling venae externae; latter much enlarged in places, and hyphal tissue of narrower portions often breaking away, leaving empty channels through ascocarp; asci short-stipitate, semiglobose to cylindric, 72–88 by 96–120 μ, 1-, 2-, or 3- (generally 2-) spored; spores dark-brown, ellipsoid to nearly globose, 40–52 by 48–72 μ, alveolate, 4 by 5 to 7 by 8 alveoli across diameters; sculpturing 4–6 μ thick.

On sandy hillside of maple, oak, and hemlock, bordering a cedar swamp. Allegan Co., Mich., Sept. 15. No. 339, U. C. Coll. *Mrs. C. H. Kauffman.*

This species, which was sent to the University of California herbarium by Professor C. H. Kauffman of the University of Michigan, was published under the name of *T. Borchii* in the 12th Report of the Michigan Academy of Sciences, 1910. The material examined, however, does not have the smooth surface of the latter as described by Vittadini (Mon. Tub., 1831) who

established the species, or by Ed. Fischer (Tuberaceen und Hemiasceen in Rabenhorst, Kryptogamen-Flora von Deutschland. V Abtheilung, 1897); the asci and spores are larger (the measurements for *T. Borchii* given by Fischer being 60–80 by 60–100 μ for asci, and 24–35 by 28–49 μ for spores). The latter measurements made without the sculpturing, may be compared with 28–40 by 36–60 μ, the measurements of the Michigan material made in the same manner. In descriptions of *T. Borchii* no mention is made of the distinguishing characters of the Michigan specimens, *i.e.*, the absence of or very small venae internae, the exceedingly large venae externae sometimes becoming hollow, and the distinct palisade-like hyphae bordering the latter veins. The spore measurements of *T. macrosporum*, given by Fischer, are comparable to those of this species (28–45 by 38–80), and the surface of the ascocarp is described as having "kleinen, abgeflacht pyramidenförmigen Warzen oder polygonalen Feldern," but here, also, paraphyses and the peculiar nature of the venae externae are not mentioned, while the reticulation of the spore surface is described—also figured by Tulasne (Fungi Hypogaei, 1851)—as very close, 10 by 15 alveoli occurring across diameters in Tulasne's illustration. The figure and descriptions represent the spore,

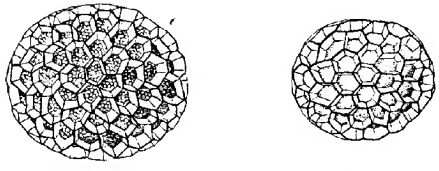


FIG. 1. Spores of the two species described. On the left, one of *Tuber canaliculatum* × 385. On the right, of *Tuber unicolor* × 625.

too, as much longer in comparison to its short diameter than that of the Michigan species.

Tuber unicolor sp. nov.

Ascocarp yellow-brown, 1–2 cm. in diam., somewhat convolute to sometimes deeply furrowed; surface very minutely scabrous; gleba yellowish with slender white veins; outer cortical tissue

coarsely pseudoparenchymatous, breaking away more or less at surface, changing within to irregular open tissue consisting of pseudoparenchyma and hyphae; sub-cortex of similar structure but more compact, and forming origin of venae internae; thickness of peridium 400–600 μ; venae internae similar in structure to sub-cortex, hyphae 4–6 μ in diam.; venae externae conspicuous, long, branching, generally twice the diam. of venae internae, similar in structure to inner cortical layer, hyphae 6 μ in diam.; asci semi-globose, 48–56 by 56–64 μ, 1–4-spored; spores yellow, globose-ellipsoid, 20–38 by 22–40 μ, alveolate, 3 by 4 to 6 by 7 alveoli across diameters, sculpturing 4–5 μ thick.

Beneath the surface of the ground, near oaks. No. 530, U. C. Coll., *L. Robba & G. Giavelli.*

Material of this species was received from Dr. Fred J. Seaver, of the New York Botanical Garden, and later from Mrs. Flora Patterson, of Washington, D. C., the material in both cases, however, having been collected near New York City by L. Robba and G. Giavelli.

Of the European species of *Tuber* described, this apparently comes nearest *T. dryophilum*, *T. maculatum*, and *T. rapaeodorum*, principally in the general characters of ascocarp surface and of spore. However, the specimens of this species examined differ from descriptions of all three in the uniform color of the ascocarp, that of the three European species mentioned being described as mottled or spotted. The unusually thick cortex and the 1–4-spored asci also distinguish our species from *T. dryophilum* as described. In gleba color and number of spores in the ascus, it differs from descriptions of *T. maculatum;* and from *T. rapaeodorum* in the usual spore number in the ascus, in the shape of the spores (the measurements cited for the spores of the latter, i.e. 29–42 by 23–29 μ, making them less nearly globose), and in the characteristic structure of the cortex described above, that of the European species as figured by Tulasne (Fung. Hyph., pl 18, fig. 1), having a distinctly pseudoparenchymatous structure without, and hyphal structure within. It is thought best to consider this, therefore, a distinct species.

AGRICULTURAL COLLEGE,
CORVALLIS, OREGON.

A PHYLLACHORELLA PARASITIC ON SARGASSUM

C. Ferdinandsen and Ö. Winge

In March, 1914, Professor C. H. Ostenfeld collected a quantity of Sargassum in the Atlantic at a locality lying at 30° 21¹ N. Lat., 45° 20¹ W. Long. Two of the plants had conspicuous protuberances, which were scattered along the stems and partly on the bladders as well. These protuberances varied in size; being sometimes as large as the head of a pin and sometimes ½–1 cm. across, irregularly rounded and knobby (Fig. 1). The knobby surface of the tumors was due to perithecia-like loculi, sometimes placed close together in a continuous stroma, giving a black color to the tumor; sometimes more scattered, the stroma not being continuous but divided into several minor stromata containing only a single or but few loculi. In the latter case the pale tissue of the host was visible between the small partial stromata.

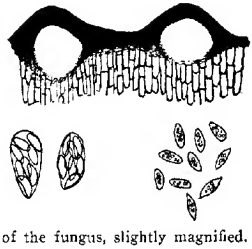


Fig. 1 (On the left). Showing the habit of the fungus, slightly magnified.
Fig. 2. Stroma with two loculi. × 15. Asci and spores. × 160.

A further investigation revealed the fact that the parasitic organism was a well-developed ascomycetous fungus, belonging

to the Dothideales. Its clypeus-like stromata refer it to the Phyllachoraceae[1] (Fig. 2). The curious substratum makes impossible a direct parallel between the position of this fungus in the tissue and that of the Phyllachoraceae, which are parasites on phanerogamous plants. However, we consider that it is correct to refer the fungus to the genus *Phyllachorella* Sydow.

The fungus was found present on two distinct species of *Sargassum*. The stromata of the fungus were usually overgrown with epiphytes. A diagnosis in Latin follows:

Phyllachorella oceanica Ferdinandsen & Winge, sp. nov.

Stromatibus matrici tumefactae insidentibus, strato corticali innatis, nunc unilocularibus, punctiformibus, nunc crustas moriformi-tuberculatas, usque ad 1 cm. latas formantibus, atris. Loculis in tuberculo singulo stromatis pluribus immersis, fere globosis, 500–800 μ diam., supreme strato nigrefacto crasso, quod saepius inter loculos plus minusve prorepit eosque interdum cingit, tectis. Stratis subjacentibus matricis hyphis fungi intertextis. Ascis late ellipsoideis, plerumque 55–77 $\mu \times$ 24–32 μ, sessilibus; paraphysibus nullis. Sporis octonis, distichis, aseptatis, hyalinis, multiguttulatis, plurimis 20–30 $\mu \times$ 10–13 μ, forma (? secundum aetatem) valde varia: saepius ellipsoideis utrinque late rotundatis vel truncatis, rarius fusiformibus, apicula recta subcurvatave predictis.

Species habitatione praedistincta, oceanica, caules nec non vesicas duarum specierum Sargassi, sub nominibus Sarg. II et Sarg. III descriptorum,[2] infestans, Lat. 33° 21′ N. Long., 45° 20′ W. mense Martio, 1914, a cl. C. H. Ostenfeld lecta.—Stromata saepe *Aglaophenia latecarinata* et *Membranipora tuberculata* obsessa.

COPENHAGEN, DENMARK.

[1] F. Theiszen and H. Sydow. Die Dothideales. Berlin, 1915.

[2] In O. Winge: The Sargasso Sea, its boundaries and vegetation. [Report on the "Thor" Expeditions, 1908–10, in the Mediterranean and adjacent seas, 1920.]

NOTES AND BRIEF ARTICLES

[*Unsigned notes are by the editor*]

Readers of MYCOLOGIA are invited to contribute to this department personal news items and notes or brief articles of interest to mycologists in general. Manuscript should be submitted before the middle of the month preceding the month in which this publication is issued.

Dr. W. C. Coker spent the Christmas holidays, December 28 to January 8, at the Garden consulting the library and mycological herbarium. He was checking up a number of fungi from North Carolina, in various groups, for early publication.

Mr. V. C. Dunlap, of Cornell University, spent several days during the Christmas holidays examining specimens of *Pleurotus* in the mycological herbarium. He was a graduate student with Professor Atkinson before he was drafted in 1918. He is now Professor Rowlee's assistant.

Mr. H. S. Bergman, formerly assistant pathologist in fruit disease investigations, Bureau of Plant Industry, has become professor of botany in the College of Hawaii, Honolulu.

The following appointments have been made in Cereal Disease Investigations, Bureau of Plant Industry: Miss Florence M. Smith, from Syracuse University, Miss Jessie I. Wood, from Leland Stanford University, Miss Grace O. Furrow, from the University of Chicago, and Mr. George H. Gillespie, who was engaged during the past summer in the campaign for barberry eradication.

Botrytis cinerea is now held responsible for various kinds of injury to many kinds of plants, and new evidences of its injurious attacks are continually being brought to light. In the *Kew Bulletin* for 1917, an account is given of the killing of a tree, *Aesculus pavia*, by this fungus.

The dreaded walnut blight, caused by *Bacterium juglandis,* which is now widely distributed in America, has been introduced with nursery stock into South Africa. According to Doidge, its development is greatly favored by rain and mist in the early part of the season, when many of the nuts drop from the trees. It is carried over to the next season in leaves and in lesions on the twigs.

Market Pathology and Market Diseases of Vegetables is the title of a very important paper contributed by Link and Gardner to *Phytopathology* for November, 1919. This study grew out of cooperative work during the war to lessen waste in the crop of vegetables after picking. After a general introduction, the various vegetables are taken up in alphabetical order and the principal diseases attacking each one are discussed.

"*Craterellus, Cantharellus,* and Related Genera," by W. C. Coker, with 25 pages and 17 plates, appeared in the *Journal of the Elisha Mitchell Scientific Society* for October, 1919. Seven species of *Craterellus* and twelve of *Cantharellus* are included for North Carolina. The photographs and the drawings of the spores are excellent, as usual. No novelties are described.

The poplar canker, *Dothichiza populea,* was studied by Mr. J. K. Primm in the vicinity of Philadelphia during the summer of 1917 and his results published the following year in the *Journal of Economic Entomology.* The Lombardy poplar suffered most severely, especially where the lower branches were pruned away. The omission of pruning and care regarding drainage are recommended for old poplar trees of all kinds. In the case of young trees, it was discovered that the only nursery which was entirely free from the disease was one that had been sprayed regularly every winter with lime-sulphur mixture.

The mosaic disease of sugar cane, which has been so destructive in Porto Rico, has recently been discovered in Louisiana and other Southern States. A circular distributed by the Porto Rican

Agricultural Station in 1918, prepared by E. D. Colón and F. S. Earle, states that the disease is incurable so far as individual plants are concerned and is probably hereditary. The employment of strictly sound material for propagation, inspection of growing crops at frequent intervals, and eradication of all but unquestionably sound canes are recommended as control measures.

Bulletin 829 of the U. S. Dept. of Agriculture, by E. W. Brandes, contains an up-to-date and full discussion of this disease, with special reference to its occurrence in the United States. Two colored plates accompany the bulletin. Methods of control which originated in Java and Hawaii and have been used with success in Porto Rico are described in detail.

A Revision of the British Clavariae, by A. D. Cotton and E. M. Wakefield, appeared in the *Transactions of the British Mycological Society* for September, 1919. This work of revision was begun in 1905, when it was intended to include all the described species of *Clavaria,* numbering about 400, and to publish a monograph of the entire genus. The confusion regarding European species, however, and the necessity for considerable careful microscopic work, caused the authors to devote their attention at first to the British species, numbering 37 in all, including *C. Broomei* and *C. Invalii,* described as new, and *C. gigaspora, C. Crosslandii, C. straminea,* and *C. persimilis,* recently published elsewhere. *Clavaria fastigiata* is reduced to a variety and 22 names have been excluded from the British list as synonyms or indeterminable. The paper contains excellent descriptions and many interesting notes but no plates, although many references to illustrations are included.

Bulletin 214 of the Connecticut Agricultural Experiment Station comprises the report of the botanist, Dr. G. P. Clinton, for the years 1917 and 1918. Five pages are devoted to the "Inspection of Phaenogamic Herbaria for Rusts on *Ribes* sps.," by Clinton, and 32 pages and 8 plates to "Infection Experiments of *Pinus Strobus* with *Cronartium ribicola,*" by Clinton and Mc-

Cormick. This latter paper is an exceedingly important one, being one of the best contributions published on the biology of this serious disease of the white pine. Other papers in the bulletin deal with spraying and fertilizer experiments.

Professor H. S. Jackson, of Lafayette, Indiana, spent several days at the Garden in February consulting the library and mycological herbarium in connection with monographic work on the rusts for *North American Flora*.

Dr. E. Mead Wilcox, formerly of the Nebraska Agricultural Experiment Station, has been appointed Director of the Santo Domingo Experiment Station, with his headquarters at Santo Domingo. He entered upon the duties of his new position on March 1.

Professor H. C. Beardslee, formerly of Asheville, North Carolina, has definitely retired from school work and will devote himself henceforth to botanical studies in which he is particularly interested. He and Mrs. Beardslee are located for the present at New Smyrna, Florida. Under date of January 25, Professor Beardslee wrote: "I am finding the fungi here very interesting and am getting some good material together."

Dr. Bernard O. Dodge, formerly of Columbia University, is now connected with the Bureau of Plant Industry at Washington, having entered upon his new duties on February 1. On the eve of his departure from Columbia, Professor and Mrs. Harper invited a number of his friends to a farewell dinner at the Faculty Club. Dr. and Mrs. Dodge were extremely active both in general botany and mycology, and they will be sadly missed in New York. It may be, however, that they will find more time for strictly mycological work in Washington.

POLYPORUS EXCURRENS Berk. & Curt.

In preparing a brief article on *Trametes serpens* for the January number of MYCOLOGIA, I stated that Miss Wakefield had

been asked to look up the type specimen of *P. excurrens* at Kew so that it might be compared with specimens called *T. serpens* in America. This she has very kindly done and I have been allowed to get a glimpse of it.

Polyporus excurrens Berk. & Curt. is only a very thin, old, shabby, entirely resupinate form of *Trametes rigida* Berk. & Mont., described in 1849 and later known as *Polystictus extensus* Cooke, *Polystictus rigens* Sacc. & Cub., *Coriolopsis rigida* (Berk. & Mont.) Murrill, and perhaps by other names. This is why I did not find it at Kew, where it is now marked "*Polyporus extensus* B. & C., Cuba, Curtis (*Wright 391*)."

This leaves our American "*Trametes serpens*" without a name. To those who think it sufficiently distinct from *Elmeriana setulosa* (P. Henn.) Bres., of the Philippine Islands, to deserve a separate name, I would suggest **Trametes subserpens.**

W. A. MURRILL.

A CORRECTION

In the article on "Some Described Species of Poria," published in MYCOLOGIA for September, 1919, the attempt to make Saccardo's classification prominent and reference to his work easy led to an error in citation, since many of the species included had already been transferred to the genus *Poria* by Cooke two years previously and Saccardo simply followed his treatment. The correct citations for the first combinations of these species, taken in order, would therefore be as follows:

Poria incrustans (Berk. & Curt.) Cooke, Grevillea 14: 114. 1886.
Poria elachista (Berk.) Cooke, Grevillea 14: 109. 1886.
Poria Salviae (Berk. & Curt.) Cooke, Grevillea 14: 112. 1886.
Poria candidissima (Schw.) Cooke, Grevillea 14: 111. 1886.
Poria calcea (Schw.) Cooke, Grevillea 14: 114. 1886.
Poria interna (Schw.) Cooke, Grevillea 14: 109. 1886.
Poria xantholoma (Schw.) Cooke, Grevillea 14: 113. 1886.
Poria limitata (Berk. & Curt.) Cooke, Grevillea 14: 113. 1886.
Poria tenuis (Schw.) Cooke, Grevillea 14: 114. 1886.
Poria Sassafras (Schw.) Cooke, Grevillea 14: 109. 1886.
Poria Alabamae (Berk. & Cooke) Cooke, Grevillea 14: 113. 1886.
Poria pulchella (Schw.) Cooke, Grevillea 14: 113. 1886.
Poria Caryae (Schw.) Cooke, Grevillea 14: 111. 1886.
Poria dryina (Berk. & Cooke) Cooke, Grevillea 14: 112. 1886.
Poria fatiscens (Berk. & Rav.) Cooke, Grevillea 14: 114. 1886.

Poria decolorans (Schw.) Cooke, Grevillea 14: 113. 1886.
Poria clathrata (Berk. & Curt.) Cooke, Grevillea 14: 112. 1886.
Poria cremor (Berk. & Curt.) Cooke, Grevillea 14: 110. 1886.
Poria rivulosa (Berk. & Curt.) Cooke, Grevillea 14: 109. 1886.
Poria anaectopora (Berk. & Curt.) Cooke, Grevillea 14: 114. 1886.
Poria vesiculosa (Berk. & Curt.) Cooke, Grevillea 14: 114. 1886.
Poria favescens (Schw.) Cooke, Grevillea 14: 113. 1886.
Poria Rhododendri (Schw.) Cooke, Grevillea 14: 113. 1886.
Poria favillacea (Berk. & Curt.) Cooke, Grevillea 14: 111. 1886.
Poria Lindbladii (Berk.) Cooke, Grevillea 14: 111. 1886.

W. A. MURRILL.

A FUND FOR SCIENTIFIC RESEARCH

The Carnegie Corporation of New York has announced its purpose to give $5,000,000 for the use of the National Academy of Sciences and the National Research Council. It is understood that a portion of the money will be used to erect in Washington a home of suitable architectural dignity for the two beneficiary organizations. The remainder will be placed in the hands of the Academy, which enjoys a federal charter, to be used as a permanent endowment for the National Research Council. This impressive gift is a fitting supplement to Mr. Carnegie's great contributions to science and industry.

The Council is a democratic organization based upon some forty of the great scientific and engineering societies of the country, which elect delegates to its constituent divisions. It is not supported or controlled by the government, differing in this respect from other similar organizations established since the beginning of the war in England, Italy, Japan, Canada and Australia. It intends, if possible, to achieve in a democracy and by democratic methods the great scientific results which the Germans achieved by autocratic methods in an autocracy while avoiding the obnoxious features of the autocratic regime.

The Council was organized in 1916 as a measure of national preparedness and its efforts during the war were mostly confined to assisting the government in the solution of pressing war-time problems involving scientific investigation. Reorganized since the war on a peace-time footing, it is now attempting to stimulate and promote scientific research in agriculture, medicine, and in-

dustry, and in every field of pure science. The war afforded a convincing demonstration of the dependence of modern nations upon scientific achievement, and nothing is more certain than that the United States will ultimately fall behind in its competition with the other great peoples of the world unless there be persistent and energetic effort expended to foster scientific discovery.

SECRETARY, NATIONAL RESEARCH COUNCIL.

DAEDALEA EXTENSA REDISCOVERED

This species was described by Peck in his annual report in 1891 as follows:

"Resupinate, thick, coriaceous, often uneven or somewhat nodulose, the margin at first cottony and white, soon changing to brown, the subiculum slightly rufescent; pores large, unequal and labyrinthiform, in vertical places oblique, whitish; spores minute, oblong, .00024 to .0003 in. long, .0001 to .00012 broad.

"Prostrate trunks of deciduous trees. Salamanca. September.

"This forms patches two feet or more in length on the sides and lower surface of the trunk. It follows the inequalities of the surface, and in vertical places it becomes more or less nodulose or develops a thick obtuse margin, which is velvety-tomentose and at length dark-brown in color, but I have seen no reflexed margin. It is suggestive of resupinate forms of *Trametes mollis*, but differs from it in the character of the pores in the thicker subiculum and in the absence of any free margin."

The type collection is gone and there is nothing left but the description; but this, like most of Peck's descriptions, is exceedingly good. I have a specimen collected a few years ago at Bloomington, Indiana, by Van Hook (*2398*) on oak and tulip-tree wood. "This fungus," he says, "grew away from the light, spreading over the surfaces of the two kinds of wood where they lay on each other. It may be a *Poria*, but it looked much like a *Daedalea* when fresh."

This specimen corresponds to Peck's description, except that the hymenium is now avellaneous instead of whitish. I have compared it with a number of resupinate specimens of *Trametes mollis* and find that it differs from them just as Peck said—espe-

cially in the character of the pores, the thicker context, and the absence of any free margin. The young margin is tomentose and whitish, becoming fulvous or brown in dried specimens.

To clear up a doubtful species is much better than to describe a new one; and mycologists are indebted to Professor Van Hook for his timely aid in this addition to our knowledge of a very rare and interesting species, which is now known from two localities instead of one.

W. A. Murrill.

INDEX TO AMERICAN MYCOLOGICAL LITERATURE

Arthur, J. C., & Mains, E. B. Grass rusts of unusual structure. Bull. Torrey Club 46: 411–415. *f. 1, 2.* 5 N 1919.
Puccinia phakopsorides sp. nov. is described.

Brandes, E. W. Banana wilt. Phytopathology 9: 339–389. *pl. 21–34* + *f. 1–5.* S 1919.

Brandes, E. W. The mosaic disease of sugar cane and other grasses. U. S. Dept. Agr. Bull. 829: 1–26. *pl. 1* + *f. 1–5.* 29 O 1919.

Brooks, M. M.—Comparative studies on respiration.—VIII. The respiration of *Bacillus subtilis* in relation to antagonism. Jour. Gen. Physiol. 2: 5–15. *f. 1–5.* 20 S 1919.

Burt, E. A. An edible garden Hebeloma. Ann. Missouri Bot. Gard. 6: 171–174. *pl. 3.* 11 O 1919.
Hebeloma hortense sp. nov.

Burt, E. A.—*Protomerulius Farlowii* Burt, n. sp. Ann. Missouri Bot. Gard. 6: 175–177. *f. 1.* 11 O 1919.

Carsner, E. Susceptibility of various plants to curly-top of sugar beet. Phytopathology 9: 413–421. *f. 1–7.* S 1919.

Dana, B. F. A preliminary note on foot-rot of cereals in the northwest. Science II. 50: 484, 485. 21 N 1919.

Davis, J. J. North American Ascochytae. Trans. Wisconsin Acad. Sci. 19: 655–670. 1919.

Davis, J. J. Notes on parasitic fungi in Wisconsin—IV. Trans. Wisconsin Acad. Sci. 19: 671–689; —V. 690–704.; —VI. 705–727. 1919. [Illust.]
Twenty-two new species are described.

Doran, W. L. The minimum, optimum, and maximum temperatures of spore germination in some Uredinales. Phytopathology 9: 392–402. *f. 1.* S 1919.

Edgerton, C. W. A new *Balansia* on *Cyperus.* Mycologia 11: 259–261. *pl. 12.* 18 O 1919.
Balansia cyperi sp. nov.

Faull, J. H. Pineapple fungus or enfant de pin or wabadou. Mycologia 11: 267–272. 18 O 1919.

Fisher, D. F., & Newcomer, E. J. Controlling important fungous and insect enemies of the pear in the humid sections of the Pacific northwest. U. S. Dept. Agr. Farm. Bull. 1056: 1–34. *f. 1–18.* S 1919.

Fisher, O. E.—Mushroom poisoning. In Kauffman, C. H. The Agaricaceae of Michigan. Mich. Geol. & Biol. Surv. **26**: 825–864. 1918.

Gustafson, F. G. Comparative studies on respiration—IX. The effect of antagonistic salts on the respiration of *Aspergillus niger*. Jour. Gen. Physiol. **2**: 17–24. *f. 1–3.* 20 S 1919.

Harter, L. L. Sweet potato diseases. U. S. Dept. Agr. Farm. Bull. 1059: 1–24. *f. 1–15.* O 1919.

Kauffman, C. H. The Agaricaceae of Michigan—Vol. I. Michigan Geol. & Biol. Surv. Publ. **26**: i-xvii + 1–924. 1918; Vol. II. *pl. 1–172.* 1918.

New species are described in *Russula* (3), *Hypholoma* (2), *Psilocybe* (1), *Cortinarius* (13), *Inocybe* (2), *Hebeloma* (1), *Galera* (2), *Crepidotus* (1), *Eccilia* (1), *Lepiota* (1), *Pleurotus* (1), *Tricholoma* (1), and *Clitocybe* (1).

Keene, M. L.—Studies of zygospore formation in *Phycomyces nitans* Kunze. Trans. Wisconsin Acad. Sci. **19**: 1195–1220. *pl. 16–18.* 1919.

Kempton, F. E. Origin and development of the pycnidium. Bot. Gaz. **68**: 233–261. *pl. 17–22.* 16 O 1919.

Levine, M. Studies on plant cancers—I. The mechanism of the formation of the leafy crown gall. Bull. Torrey Club **46**: 447–452. *pl. 17, 18.* N 1919.

Murrill, W. A. Collecting fungi in Virginia. Mycologia **11**: 277–279. 18 O 1919.

Murrill, W. A. Some described species of *Poria*. Mycologia **11**: 231–244. 18 O 1919.

Overholts, L. O. Some Colorado fungi. Mycologia **11**: 245–258. 18 O 1919.

Pammel, L. H. Recent literature on fungous diseases of plants. Trans. Iowa Hort. Soc. **53**: 185–225. 1918.

Peltier, G. L. Carnation stem rot and its control. Illinois Agr. Exp. Bull. 223: 579–607. *f. 1–5.* S 1919.

Rankin, W. H. Manual of tree diseases. i-xx + 1–398. *f. 1–70.* New York, 1918.

Schmitz, H., & Zeller, S. M. Studies in the physiology of the fungi—IX. Enzyme action in *Armillaria mellea* Vahl. *Daedalea confragosa* (Bolt.) Fr. and *Polyporus lucidus* (Leys.) Fr. Ann. Missouri Bot. Gard. **6**: 193–200. *pl. 4, f. 1–12.* S 1919.

Schultz, E. S., and others. Investigations on the mosaic disease of the Irish potato. Jour. Agr. Research **17**: 247–274. *pl. A, B, 25–30.* 15 S 1919.

Sears, F. C. Productive orcharding. i-xiv + 1–315. *f. 1–155.* Philadelphia. 4 Mr 1919.

Second edition revised, contains chapter on diseases of trees.

Shapovalov, M. Is the common potato scab controllable by a mere rotation of crops? Phytopathology **9**: 422–424. *f. 1.* S 1919.

Steinberg, R. A. A study of some factors in the chemical stimulation of the growth of *Aspergillus niger.* Am. Jour. Bot. **6**: 330–356. 20 N 1919; 357–372. N 1919.

Stevens, F. L. Foot-rot disease of wheat. Historical and bibliographic. Illinois Nat. Hist. Surv. Bull. **13**: 259–286. *f. 1.* O 1919.

Turley, H. E. New fruit fungi found on the Chicago market. Science II. **50**: 375, 376. 17 O 1919.

Vogel, I. H. A rose graft disease. Phytopathology **9**: 403–412. *f. 1–6.* S 1919.

Webb, R. W. Studies in the physiology of the fungi—X. Germination of the spores of certain fungi in relation to hydrogen-ion concentration. Ann. Missouri Bot. Gard. **6**: 201–222. *f. 1–5.* 11 O 1919.

West, E. An undescribed timber decay of hemlock. Mycologia **11**: 262–266. 18 O 1919.

Weir, J. R. Pathological marking rules for Idaho and Montana. Jour. Forestry **17**: 666–681. O 1919.

Weir, J. R., & Hubert, E. E. A study of the rots of western white pine. U. S. Dept. Agr. Bull. 799: 1–24. 10 N 1919.

Zeller, S. M., & Schmitz, H. Studies in the physiology of the fungi—VIII. Mixed cultures. Ann. Missouri Bot. Gard. **6**: 183–192. *pl. 4.* 11 O 1919.